RAILROAD GAZETTE

SATURDAY, APRIL 19, 1873.

Hornig's Patent Shear and Punching Machines—Single-Lever Construction.

The following machines were designed lately under the patent granted February 7, 1865, and reissued November 9, 1869, to Julius L. Hornig, as indicated in an article on "Double-Lever Shears," in the RAILROAD GAZETTE of September 28, 1872.

The principal operating parts in this construction are the same as in the double-lever machines, but peculiar advantageous arrangements make this serviceable as a hand or power machine. The prominent features of these machines are the lever movements and connections with the operating eccentric. The lever vibrates on a fulcrum pin, which is securely fixed in the massive frame. The lever is driven by an eccentric, against which it bears, shaped to form a large segmental face, which remains in constant contact with the eccentric, transmitting the power, while the center of such segment furnishes the mathematically correct fulcrum for the attachment of an eccentric strap, which takes no portion of the strain, but is used simply to draw or hold the lever back against the face of the eccentric, ready to receive its impulse. The eccentric and its shaft are provided with a gear, which receives its motion through a pinion on the driving shaft, which is provided with a fly-wheel projecting on one side of the frame. This fly-wheel can be used also as a belt-wheel, and is provided with a crank-handle to make it suitable for hand power.

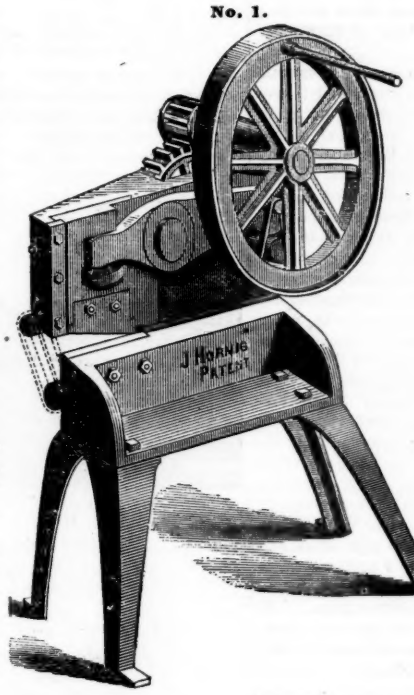
The frame, cutting-tools and dies may be varied as in the double-lever machines formerly described, to suit special purposes, and serve for shearing, punching, pressing, bending, etc. The lever may be provided with a shear-knife and the frame provided with a jaw with a similar stationary knife, operating like the customary lever-bar shears; but by its connection with the eccentric it is enabled to operate at any desired speed, without jumping the lever or jarring. The accompanying engravings show the lever operating by means of a strong, tooth-shaped projecting part in a horizontal position to the lever fulcrum, a suitable slide-block provided with a shear knife or punching tool being guided in the frame, for vertical motion.

No. 1 shows the construction for continuous shearing or plate shear, with additional provision for strengthening the frame by means of a wrought-iron link, to be applied as shown in the dotted lines, when required for cutting heavier bars.

No. 2 shows the construction for punching or pressing with the provision of an adjustable press or die-block, and with punch adjustment, where interruption in operation is desirable, without stopping the running of the machine. The crosshead or slideblock has an open space equal to the throw of the side-block, so that the slideblock may be held stationary by friction and elevated while the lever-tooth moves up and down until a filling-in piece is shoved in the space, being part of a hand lever, when the slideblock is consequently moved and operates. An adjustable stop arrangement is also provided, to lower the slideblock with punching tool to the surface of the metal to be punched; while the filling-in piece is withdrawn, and the friction on the slideblock is not so great as to retain the slideblock elevated and stationary, the slideblock will drop with the motion of the lever until the handle part of the filling-in piece finds a rest on the adjusted stop arrangement. When the filling-in piece is placed in operation, the handle part will clear the stop attachment, and the complete stroke will be accomplished.

Different sizes and suitable frame construction to suit any branch of light and heavy manufacture will be manufactured, made to order and supplied by Elmes, Brackett & Co., Columbian Iron Works, Chicago, Ill.; by Paulding, Kemble & Co., West Point Foundry, New York, and by N. B. Cushing, Jersey City Machine Shops, foot of Morris street, Jersey City. Several of the above machines are in course of construction, and complete punch and shears can be seen and purchased.

No. 1.



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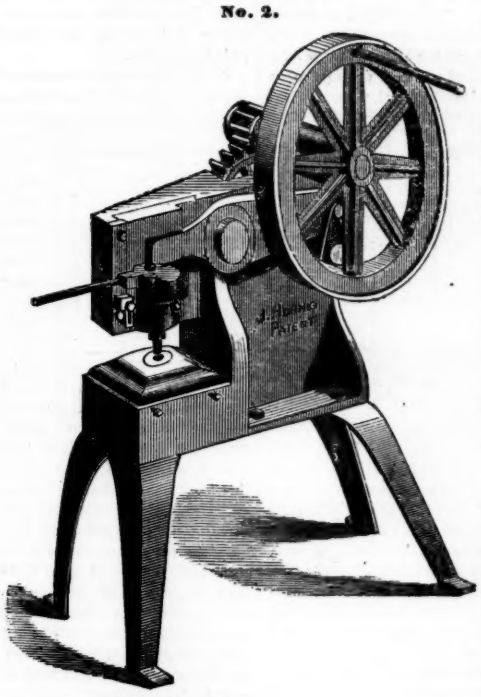


PATENT SHEAR AND PUNCHING MACHINES.

Railroad Manufactures.

The Indianapolis Car Company has its buildings completed and will soon commence operations. The buildings, which are of brick, with slate roofs, comprise a machine shop, 315 by 60 feet; a wood-working shop, 315 by 50; foundry and boiler shop, 315 by 50; erecting shop, 175 by 50; boiler and engine house, 85 by 50; pattern shop and storehouse, 75 by 50, two stories high, and office, 75 by 25. The company expects to manufacture stationary engines and other machine work, besides freight cars.

The Portland Company, at Portland, Me., is building eight locomotives for the Intercolonial Railway.

Contributions.

To Find Length of Brace in a Howe-Truss Bridge.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY,
BOSTON, April 7, 1873.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The problem proposed by Frank Pearl, C.E., on page 127, issue of March 29, of your GAZETTE, does not in general admit of a mathematically exact and at the same time *practicable* solution. The method of solution which the practical and experienced draughtsman would most readily adopt would be to find, by trial on a drawing of the panel of suitable size, the proper position and length of the brace.

The following investigation and approximate solution may be acceptable. The letters refer to the accompanying sketch. By the length and breadth of the panel is meant the net length and breadth, exclusive of the breadth of the top of the *angle block*, or the depth to which it is sunk in the chord of the truss. These are independent of the problem.

Let $L=AB$ be the net length of panel.
$B=AC$ be the net breadth or depth of panel.
$l=EF$ be the length of brace.
$b=EG$ be the breadth of brace.
$m=CG$ be the half breadth of angle block.
$n=EC$ be the height of angle block.

Then, drawing EQ parallel to CD and FR parallel to AC, by the conditions of the problem the angles CEG and FEP are equal. Therefore the right triangles CEG and FEP are similar, and give rise to the following proportion:

$$\frac{CG}{CE}=\frac{FP}{EP}, \text{ or } \frac{m}{n}=\frac{B-n}{L-m} \qquad (1.)$$

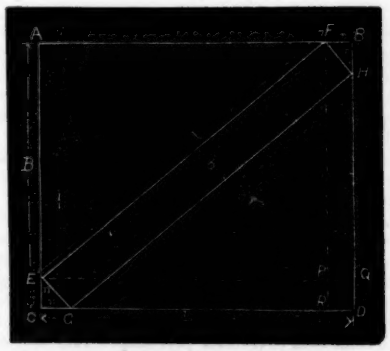
Also in the right triangle CEG,

$$CG^2+CE^2=GE^2, \text{ or } m^2+n^2=b^2 \qquad (2.)$$

Combining equations (1.) and (2.), we derive,

$$\sqrt{b^2-n^2}\,(L-\sqrt{b^2-n^2})=n\,(B-n) \qquad (3.)$$

Which, being cleared of radicals and developed, gives rise to a complete equation of the fourth degree, containing the unknown quantity n. The solution of this by ordinary algebra is impracticable. We may approximate as follows:



Let

$$m', n', l', m'', n'', l'',$$

be first and second approximations to the true values,

$$m, n, l.$$

Then we may say:

$$\frac{m'}{n'}=\frac{B}{L}, \text{ and } m'^2+n'^2=b^2$$

whence,

$$n'=\frac{bL}{\sqrt{B^2+L^2}} \qquad (4.)$$

and

$$m'=\sqrt{b^2-n'^2} \qquad (5.)$$

also

$$l'=\sqrt{(B-n')^2+(L-m')^2} \qquad (6.)$$

Substituting the approximate values m' and n' of m and n, in the second member of (1), we have:

$$\frac{m''}{n''}=\frac{B-n'}{L-m'} \qquad (7.)$$

we also have:

$$m''^2+n''^2=b^2 \qquad (8.)$$

hence,

$$n''=\frac{b\,(L-m')}{\sqrt{(B-n')^2+(L-m')^2}}$$

or,

$$n''=\frac{b\,(L-m')}{l'} \qquad (9.)$$

then,

$$m''=\sqrt{b^2-n''^2} \qquad (10.)$$

and,

$$l''=\sqrt{(B-n'')^2+(L-m'')^2} \qquad (11.)$$

The approximation may be carried still farther, if necessary.

An example will elucidate:

Given, in accordance with the foregoing notation, all dimensions in inches, the following quantities: $L=45$; $B=38$; $b=6$; required m, n and l.

First approximation. From (4):

$$n'=\frac{6\times 45}{\sqrt{38^2+45^2}}=5.14$$

From (5):

$$m'=\sqrt{6^2-5.14^2}=3.09$$

From (6):

$$l'=\sqrt{(38-5.14)^2+(45-3.09)^2}=\sqrt{32.86^2+41.91^2}=53.26$$

Second approximation. From (9):

$$n''=\frac{6\times 41.91}{53.26}=4.72$$

From (10):

$$m''=\sqrt{6^2-4.72^2}=3.70$$

From (11):

$$l''=\sqrt{(38-4.72)^2+(45-3.70)^2}$$
$$=\sqrt{33.28^2+41.30^2}=53.18$$

The value of the second approximation to the length of the brace is seen to differ from that of the first by only 0.08 of an inch (less than 3-32 inch), or 1-665 of the entire length of the brace.

AMATEUR.

The Care of Steam Boilers.

TO THE EDITOR OF THE RAILROAD GAZETTE:

As the explosion of steam boilers from time to time calls forth the opinions and theories of experts as to their causes and the prevention of the same, it has occurred to me that explosions are brought about generally by carelessness and ignorance on the part of those in charge of steam boilers, one of which evils is blowing out boilers while under a heavy pressure. I will dwell principally on locomotive boilers, and state what I have seen. Let us look into the *modus operandi* as practiced by some railroad companies. When a boiler is reported dirty, it is blown out under a considerable pressure. As soon as the water and steam are all blown out, the hose is attached and the boiler subjected to the terrible ordeal of a cold bath. All this is done without once taking into consideration the laws of expansion and contraction. Look at the result: leaky tubes, seams started, and the boiler weakened generally; not only this, but by the expansion and sudden contraction of the shell of the boiler there is a shearing effect produced on the rivets, and why should it not hasten an explosion? And after putting the boiler through this destroying ordeal, the object most desired, namely, cleaning the boiler, is not obtained, except to a limited extent. It is a well-known fact that the foreign matter that goes into boilers with the feed water is soluble, and that it floats on top of the water in the boiler, so that in blowing down, while there is a heavy pressure on the boiler, this floating matter lodges on the tubes and crown sheet and there remains hard and fast. I will now give my experience as an engineer in blowing out locomotive boilers (although it may be condemned by some of the readers of the GAZETTE). I allow the steam to fall to about forty pounds by the gauge, then open the blow-out cock and blow out all the water; then close the blow-out cock; by looking at the gauge, I find that the steam has fallen but very little. I now allow the steam to condense in the boiler until it has fallen to about the pressure of the atmosphere; then open the blower and one or two of the gauge-cocks, to prevent a vacuum in the boiler as the steam condenses. After the boiler has got cold enough to bear the hand on it, the plug in the boiler-head near the crown-sheet is taken out (not all locomotive boilers have this plug), and the hose pipe inserted, and the boiler washed out through the blow-out cock and hand-holes. By allowing the steam to condense in the boiler, we loosen the scale that has been deposited on the tubes and crown-sheet. In proof of this theory, let any one try this plan and examine the scale that washes out; you will find that it is moulded to the shape of the tubes and other parts of the boiler.

It will pay railroad companies to allow their boilers to cool off before filling with cold water.

W. DE SANNO.

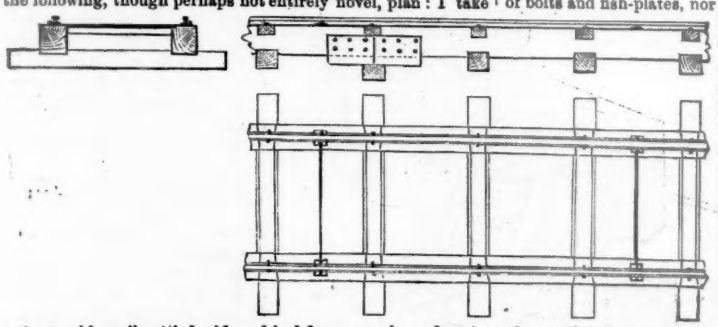
OIL CITY, April 7, 1873.

Proposed Improvements in Track and Track Foundations for Railroads.

To the Editor of the Railroad Gazette:

Amidst the great contrariety of opinion upon the question of railway joints, upon which, from some experience and observation, I profess to have a decided opinion, I propose to go beyond that question entirely and advocate another method, new at least in some respects, as far as I am able to say, of laying track upon railroads, eliminating entirely the question of fish-joints or clamp chairs.

In the first place, I desire to make a foundation upon which to lay my iron, of such a quality that I shall have all the elasticity necessary for the preservation of the rails, and which shall give a uniform bearing for the base or flange of the rail, so that the question of low joints shall never enter into the calculation of cost at all. And, having accomplished that, I propose to abandon the present mode of ignoring every principle of stability in order to get a rail of a pattern which shall have only one merit—that of being suitable for a fish plate—and use a pattern of rail which, without holes, shall combine not only all of the strength that iron should have throughout its entire length, but shall be 30 per cent. lighter than the iron it is now considered necessary to use, and which shall last at the least calculation once and a half the usual life time of rails made of the same material in use and laid with cross ties as at present, for I claim that the present extraordinary weight of rails has been the result of the attempt to make a rail which would allow a fish plate to set well under the ball. And having accomplished that, I propose to keep up the track with just half the force as at present used on the most economical road in the country with which I am acquainted, and not only so, but with 75 per cent. less material in spikes, bolts, nuts, chairs, fish-plates and tools, to say nothing of the saving in damage to rolling stock, saving in machinery, machine shops and machine tools. All of which I propose upon the following, though perhaps not entirely novel, plan: I take



a thoroughly well-settled, old road-bed for my work, and not a new embankment. I take, first, 1,300 cross ties—8 x 10, 8 feet long—to the mile, and bed them full down, settling them in the most perfect manner, and bringing the upper surface to a perfect grade; and upon these ties I would lay 10 x 12 stringers, let into the ties one inch, and placed so that the distance between the centers of the stringers would be exactly equal to the gauge of the road plus the width of the rail. I would fish those joints so that they would be as strong as the other parts of the timber, and, in addition, would lay a longitudinal piece of 4 x 10 under each joint; and at every four feet on top I would put cross ties of oak or catalpa, dovetailed into the stringers, so that they would be held exactly to gauge. All of this timber I would either Burnetize or get of catalpa, which is said to last a great many years. These stringers I now propose to adjust and settle so that there shall be, if possible, no irregular variation in the grade or surface. Arranging my timber for curves in the most substantial and careful manner, I should now lay my rails upon those stringers with screw spikes, so that no spike would have to be drawn during the lifetime of the wood.

At every joint I propose to put what I shall call a gauge chair. It is two chairs attached by a rod or bar of iron about ¾ of an inch diameter, and just so long that when placed on the stringers the rails would lay in the chairs exactly in gauge, not varying a hair; and their only office to be to grasp the iron and hold it firmly so that no possible variation could exist in the track. A slot in the chair would give room for the screw spike to be moved, so that the gauge chair bar could be lifted out in a few moments. After the track had been fully laid I would ballast to the top of stringer with broken stone and gravel, so that the track would be held firmly in line. Of course, in first laying this track there need not be the least variation either in the alignment or grade. Nor could the track get out of line until the timber began to rot, which it ought not to do under 15 or 20 years, if then. Now the timber being elastic and in all twenty inches deep, frost would have comparatively but little effect, and the elasticity would be at all times sufficient to preserve the iron from the great wear and tear consequent upon the shallow depth to which cross ties are always laid, and the rigidity they attain in the winter time would be avoided. It can readily be seen that we shall have no constant expense of broken spikes, bolts, fish-plates and chairs, which run up to such an enormous sum upon roads under the present system. We should have no broken rails, the fruitful source of disaster to persons and property. There would be no spreading of track, no cry of narrow gauge or wide gauge, and but comparatively little use of tools; certainly no constant use of the spike maul to maul down the constantly rising spikes, little or no chance for the track to get out of level or out of line, no tamping of 3,000 ties to the mile; and if the timbers should go down at all, I claim that they can be raised as easily as the ties by using proper appliances, when the gravel would follow the interstices and fill up as fast as the appliance would raise the stringers. To examine into this matter by figures, I have made the following calculation, which I leave to any expert to criticise, referring to the plans annexed:

NEW PLAN.

1,320 cross-ties at 75 cents, Burnetized	$990
10 560 running feet of stringer=105,600, B. M. 25	2,640
528 pieces under joist of timber=6,400, B. M. 25	160
1,320 upper ties, 6 feet long, 4x6=15,840, B. M. 25	396
528 fish pieces=6,400	160
Cost of foundation for iron put in	$4,846
70 tons of iron at $85 per ton (45 lbs. to the yard)	5,950
4 000 lbs. spikes (screw)	250
352 gauge chairs, 25 lbs., at $1 each	352
Total cost per mile	$10,898

OLD PLAN.

2,640 cross-ties at 75 cents	$1.980
100 tons of iron rails	8,500
6,000 lbs. of spikes	300
352 joints fish-plates	352
Total cost per mile	$11,132

Now, allowing that repairs of timber work and renewals are the same in old as in new plan, I will simply compare iron material, which in the old I renew once in 5 years and in the new about every 6⅔ years.

OLD PLAN.

First cost	$11,132
First renewal of iron, including spikes, 5 years	8.800
Second " " " " "	8.800
Third " " " " "	8,800
End of 20 years	$37,532

NEW PLAN.

First cost	$10,738
First renewal, 6⅔ years, iron	5 950
Second " " "	5,950
End of 20 years	$22,638

Making a saving of $15,000 per mile in 20 years.

Now, suppose it will cost $800 per mile to keep up track under the present system, and that it will cost one-half—which I think reasonable—under the new system, there will be a saving of $8,000 per mile in 20 years, or a total of $23,000 per mile in 20 years.

In this I have made no comparison of the constant renewals of bolts and fish-plates, nor breaking of ties, etc.; and I have left out all calculations of saving in tools, saving in machinery, rolling stock, etc. Nor have I taken any account of interest saved. And I have made no estimate of the advantage arising from having a road riding probably easier than any other road in the country, and of the consequent increase of receipts both in freight and passengers; nor of the saving in force in every other department; leaving the subject simply to recommend itself to the mind of capitalists, upon the naked merits of the saving of over one thousand dollars per mile annually, by being enabled to use a weight of iron 30 per cent. lighter upon a proper foundation.

So far superior do I consider this plan to the old one of cross ties, that I think that the saving in repairs would warrant a still greater expense in first cost, which would be as follows: Place at every eight feet in the track two stone piers with a base two feet square, top of a foot, and two feet high—in all five cubic feet each, = 10 cubic feet every 8 feet, = 6,600 cubic feet per mile, or say 180 perches of masonry per mile; which in cement, with excavation, would cost say $2,000 per mile. This filled up closely and packed with gravel would furnish a foundation which could not give way: and it would be safe to say that the diminution in repairs would counterbalance extra cost in a very short time.

The comparison of each on stone foundation and on ties would stand thus:

NEW PLAN.

First cost per mile	$10,738
Stone foundation per mile	2.000
Two renewals	11,900
Total cost per mile in 20 years	$24,638

OLD PLAN.

First cost per mile	$11,132
Three renewals	26,400
Total cost per mile in 20 years	$37,532

It might be said that the stone would make too solid a foundation and thus cause wear to the iron, which it is proposed to avoid by this plan. But I am of opinion that the 20 inches of timber, with 8 feet span, would give all the elasticity required.

Probably it would be well to put two gauge chairs to each rail, which would add to the cost $350 per mile. But with all the original expense, including stone foundations as above, there will be a saving of $1,000 per mile per annum.

A glance at the accident reports in your paper for the last month, which do not exhibit more than a fraction of those occurring, will show the urgent necessity of reform. Possibly a discussion of the subject will at least develop a more satisfactory method than the present. If we may rid ourselves of the heavy, unwieldly rails, devoted simply to the use of a fish-plate, and come back to the little pear-shaped rail, devoted to strength and durability, we may certainly hope to keep trains long enough upon it to pay for the iron itself, even if a company may not declare dividends.

If I should go into the question of the interest saved in twenty years upon $400 per mile per annum, or even upon $100 per mile saved, it would be too great to be readily believed.

If it should be alleged that my first estimate is too small for the new plan, I think it is demonstrable that $1,000 per mile may be added to the first cost and still not alter my conclusions, viz., that there will be a saving of $1,000 per mile per annum.

C. L.

[We fear our correspondent is a little too sanguine regarding the advantages of the plan he proposes.—Editor Railroad Gazette.]

Calculating End Areas.

Portland, Oregon, March 27, 1873.

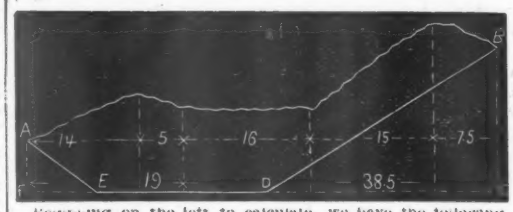
To the Editor of the Railroad Gazette:

In your issue of March 8, Mr. H. B. Allen gives a method of dividing a diagram into triangles to calculate the area.

The following method requires no diagram. For example, take the cross-section given by Mr. Allen, base 20 feet, slope 1½ to 1:

Station.	Left.		Center.	Right.		
93	6.0	12.0	10.0	10.0	20.0	19 0
	19.0	5.0		16.0	31.0	38.5

The upper figures show the cut or fill and the lower figures the distance out. This brings all the cuts or fills on the same line.



Beginning on the left to calculate, we have the following double areas:

$(6.0 + 12.0) \times (19.0 - 5.0) = 18.0 \times 14.0 = 252.0$
$(12.0 + 10.0) \times 5.0 = 22.0 \times 5.0 = 110.0$
$(10.0 + 10.0) \times 16.0 = 20.0 \times 16.0 = 320.0$
$(10.0 + 20.0) \times (31.0 - 16.0) = 30.0 \times 15.0 = 450.0$
$(20.0 + 19.0) \times (38.5 - 31.0) = 39.0 \times 7.5 = 292.5$

$2 \times$ area of $ABCF$ $= 1,424.5$

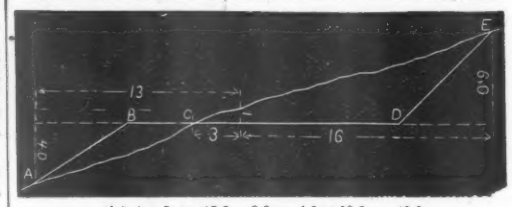
$(6 \times 9) + (19 \times 28.5) = (6^2 + 19^2) \times 1.5$ or $2 \times$ area of $AFE + DCB$ $= 595.5$

$2 \times$ area of $ABDE$ $= 829.0$

The following might be a hint to a new beginner:

Road-bed in cut, 20 feet; slope, 1 to 1.
" " fill, 14 feet; " 1½ to 1.
Fills marked —. Cuts marked +.

Station.	Left.		Center.	Right.
95	— 4.0	0.0	+ 1.0	+ 6 0
	13.0	3.0		16.0



$(4.0 + 6.0) \times (13.0 - 3.0) = 4.0 \times 10.0 = 40.0$
$4^2 \times 1.5 = 16 + 8 = 24.0$

Double area of ABC $= 16.0$

$(0 0 + 1.0) \times 3.0 = 1.0 \times 3.0 = 3.0$
$(1.0 + 6.0) \times 16.0 = 7.0 \times 16.0 = 112 0$
115.0
$6 \times 6 = 6^2 = 36.0$

Double area of CED $= 79.0$

J. A. Hurlburt.

The Brotherhood of Engineers and Strikes.

Office of the Grand International Division of the Brotherhood of Locomotive Engineers, Cleveland, O., April 10, 1873.

To the Editor of the Railroad Gazette:

Your article on "Strikes" in your paper of April 5 is well timed and in excellent taste.

The language of the note from Division 86 is both rough and disrespectful; but I attribute the style to the locality of the country more than to any disposition to be ungentlemanly. Mr. Van Horne headed a dispatch to the Chief of Police, which was printed in the St. Louis papers, "Hell is to pay at St. Charles." This style is all right for Missouri, but it would be thought rough in other sections of the country. After all that has passed, I do not have the least doubt but what Chapin would have been removed if his true character and abilities had been shown up in a proper manner.

Legal investigations to be had will no doubt disclose the real culprits that were engaged in the riots. The Brotherhood are as anxious to know who they are as the railway company can possibly be.

The detail of procedure to inaugurate a legal strike by the Brotherhood has been heretofore a private matter; but the persistent efforts of Mr. Van Horne to fasten the responsibility of this strike upon the whole organization forced me to publish our rules governing such matters. I am now anxious to have every railway official fully understand our rules relating to strikes. I believe it will restore confidence, and place our organization upon its true basis.

I found a serious difficulty in my investigation to find out who was responsible for the bad management of Division 86. Now they see their mistake, each tries to attach all the blame to some one else. If we can contrive to have the names of all our members attached to any request or demand they make, I think the present difficulty will be obviated.

Our organization always favored arbitration, and I view the plan to submit all *demands* that are to be made upon a railroad company to all our sub-divisions first as virtually arbitration. Of course it is one-sided to a certain extent; but in case they vote aye, they vote to support the engineers while out of work,

and men are not apt to vote money out of their pockets without good cause. Thanking you for your good counsel, and with kind regards, I am, Yours truly,

CHARLES WILSON, G. C. E.

Limitations of a "Universal" Rule for Computing Cross-Sections.

No. 117 NORTH ELEVENTH STREET, PHILADELPHIA, April 7, 1873.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I see in your issue of the 5th inst. a rule for computing cross-sections by Arthur B. Gillette, C. E. As these papers from correspondents are published for the benefit of the uninitiated, and as Mr. Gillette says his rule will apply universally, for the protection of the inexperienced I ask leave to modify somewhat that term.

If he means where slopes are regular, as in embankment or in cuts of only one kind of material, it is, of course, correct; but in cuts of two or more kinds of material—which frequently occur—the rule for subtracting quantities left by slopes will not apply.

In solid rock the slope is generally 1 to 4.

In loose rock the slope is generally 1 to 2.

In earth, unless sand or very loose earth, 1 to 1.

Then in a cut of solid rock, loose rock and earth, we must get quantities in figure as though the excavation were made perpendicular from slope stakes, according to the rule. Then deduct for each side: 1st, a right-angled triangle whose altitude is depth of solid rock cutting and base one-quarter of depth. 2d (trapezoid), a figure whose parallel sides are depth of solid rock, and depth to top of loose rock; altitude, distance between changes of slopes. 3d (trapezoid), a similar figure, whose parallel sides are depth to top of loose rock and depth of cutting at slope stake; and altitude, distance from last change of slope to slope stake (of course these distances for altitudes are taken horizontally). Probably all engineers will admit the necessity, or at least the great advantage, of having cross-section drawings where two or more kinds of material are taken from same cut.

J. W. B.

The Question for Scientists—A Withdrawal.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I had observed the fallacy that was inadvertently introduced and is contained in my remarks published in the GAZETTE of March 8, before reading Mr. Chavannes' "Defence," published in the GAZETTE of April 5, but concluded to await criticism before withdrawing them. I now distinctly withdraw the argument contained in those remarks, and *admit* that the pressure of trains upon the right-hand rail, resulting from the earth's rotary motion, is so insignificant that when expressed in foot-pounds it is practically inappreciable.

J. E. HENDRICKS.

DES MOINES, Iowa, April 9, 1873.

Delinquencies in Paying Employees.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Being a subscriber to your valuable paper, and believing it to have a very extended circulation among the railroad fraternity, I desire to call the attention of presidents and directors of roads to the growing evil and injustice that obtains in some very large corporations of postponing the payment of employees for their services till "forbearance ceases to be a virtue."

As the subjoined letter fully sets forth the views intended, I trust you will insert it in your columns that all those who have the furnishing of the sinews of a railroad and who may feel the "shoe pinch" will amend their ways accordingly—after perusing this letter:

"To COL. A. B. C., *President X., Y. & Z. Railroad:*

"DEAR SIR—Having recently been invited to say whether my services could be obtained on a narrow-gauge railroad, and being anxious to follow in the footsteps (in a small way) of some of my illustrious superior officers, and to illustrate as far as possible, in my own person that good old maxim of Rob Roy, 'Hold what you've got and get all you can,' I desire most respectfully to inquire whether, in addition to my varied and multitudinous duties, I cannot, by and with the advice and consent of the Senate—that is, the Board of Directors, Superintendent and yourself—hold what I've got, and at the same time put myself in a position to see 'what color of money' a narrow-gauge railroad company has, and thereby place my *per diem* on somewhat of a more sure footing and figure; more especially as in these days of uncertainty it would be well and wise for one of my profession to look ahead and allow a larger margin for 'contingencies' than formerly, as there is no telling when 'thieves may break through and steal'—or the breeching may break. I am led to believe that this request will be granted; especially do I think so when I press the convincing argument that notwithstanding I occupy an office of no small distinction on the X., Y. & Z. Railroad, the B. & F. Railroad, the A., W. & C. Railroad, and last, but not least, a still more responsible office on the T., N. & R. Railroad, and have received no salary from either or any of these powerful corporations (all being under your control) since December last, or from any other source, and being entirely dependent upon these companies for a livelihood, I submit that you and every other reasonable man will agree with me that I will not only be doing great violence to my feelings and professional pride, but gross and incalculable injury and injustice to my family, did I not desire to see if there really was any difference in the color of the money on a *narrow-gauge* railroad from that of the *standard gauge*.

"With considerations of high regard, I am

"Very respectfully, your obedient servant,

"V. S. S."

—Mr. George B. Wright has resigned his position as General Agent of the Land Department of the Northern Pacific Railroad Company. Mr. Wright has held this position since the first organization of the Department.

Railroads as Post Roads—Power of the General Government to Exact Mail Service.

During the examinations before the Senate Committee on Transportation, held in New York last week, with reference to the postal-car controversy, there have been some striking facts brough out and some suggestive arguments, by men who certainly do not lack opportunity for understanding the question thoroughly. On the 11th inst., Mr. Theodore Cuyler, Attorney of the Pennsylvania Railroad Company, before the committee, made an argument on this power of the Government in the case, which was very pointed and striking. The following report of his speech and of the discussion which followed we give as reported in the New York *Tribune:*

GENTLEMEN OF THE COMMITTEE: I will discuss the powers of the General Government, first, to compel the railway companies to carry the mails without compensation; second to compel them to carry the mails, the Government itself fixing the terms; and third, to seize the machinery of the various transportation companies and do the work itself. These are, as I understand the matter, the propositions under discussion. We are not called upon to discuss the question of the powers of the Government in time of war; but even during the war of the Rebellion the Government recognized the rights of properly, and, while seizing it, as necessity demanded, it at the same time acknowledged the necessity of paying for it; yet in this nineteenth century we find the proposition gravely discussed that the Government may apply private property to its own use on its own terms. Before this right is conceded by American citizens we must first sacrifice our American manhood. If the right is maintained it must be under the provision of the Constitution empowering the National Government to establish post offices and post roads. Undoubtedly it has the power to establish post offices and post roads; and it has the same rights in reference to the former as to the latter. Suppose it to be decided that my house is the proper place for a post office; has the department the right to take it, making me no compensation, or such as it shall arbitrarily fix? Railroads are private corporations. They derive no franchise from the General Government. Their property is the private property of an artificial citizen, but none the less a citizen. Is there any provision more thoroughly established than that private property shall not be taken for public uses without compensation? If there were no such constitutional provision, common sense would have established such a law; yet in this case it is gravely discussed whether the Government shall take arbitrary possession of private property on its own terms. It has heretofore claimed no such power. When in the Rebellion it became necessary to use the railroads for transporting troops and munitions of war, it gathered the chiefs of the transporting companies together in Washington, and asked what terms they would make, treating the government as their most favored customer. If such right had been claimed, I fear that the Rebellion would have been far more widespread than it was.

Mr. Cuyler cited the decision of Chief-Justice Robertson in the case of Dickey against The Turnpike Company (7 Dana's Kentucky Reports, page 113), in which a claim had been set up by the plaintiff, a mail contractor, that he had a right to carry the mails in his own coaches over the Maysville & Lexington Turnpike, without paying the usual tolls. The decision, which was read at length by Mr. Cuyler, affirmed emphatically that private property could not be used without just compensation. The Turnpike road was the property of the company, and was to be used in its own way, subject to the provisions of its charter. The State, from which alone its chartered rights are derived, could not exercise the arbitrary powers claimed by Dickey without impairing the soundness of its own contracts.

Mr. Cuyler continued: I cannot conceive the power of Congress to compel a railroad to carry the mails and to fix the rates of compensation, unless Congress also has the right to create the road; that is, to compel the State to charter it, the public to subscribe to the stock, and the company to build and equip it. This supposition is absurd. These companies are the artificial citizens of the States creating them, having all the rights conferred upon them by their charters, in return for which they have assumed duties and obligations. They are bound to treat all persons alike, and to transport passengers and freight for all upon the same terms and conditions. They cannot treat me differently from others, and I find no power to treat them differently from other individuals. The Government may say to them, "You shall carry the mails," and they cannot refuse without violating the conditions of their being; but it may not compel them to carry the mails without compensation. They are not the creatures of the Government, and owe it only the allegiance which private citizens owe. I do not care to argue this matter further. I prefer to leave it to the instinctive feeling of every American mind. Only let the doctrine be avowed that the Government has a right to lay its hand on the property of private citizens, and use it without compensation, and we will have not only the provocation, but the justification of a revolution. I can conceive of no higher, no graver usurpation of power.

DISCUSSION.

Senator Conkling asked Mr. Cuyler if he treated the taking of a road and of the uses of a road as the same.

Mr. Cuyler answered that he treated them as the same. They were both private property. He recognized the right of the Government to take them, but not without just compensation.

Senator Conkling asked what he had to say about the right of Congress to regulate the transportation of freight and the tolls on roads extending through States and connecting with other roads traversing other States.

Mr. Cuyler—I deny the right, and protest against it with all the powers of my being—from the crown of my head to the sole of my feet I hold that the Government is bound to respect the rights of corporations exactly as the States are bound to respect them.

Senator Conkling—You then deny the power of the General Government to regulate the carrying of cattle over the railroads; to say that they shall be carried only a certain distance without rest, food, water, &c.

Mr. Cuyler—I do deny that it possesses such power. The State may regulate these matters, but only by virtue of its police power. I hold the old-fashioned doctrine of the limitations of governmental powers, and have been unable to educate myself up to the new doctrine held by so many, though I have tried.

Senator Mitchell—If the railroad company refuse to give up the road, would you demand for the road a trial by jury?

Mr. Cuyler—No; but I would demand that the compensation to be paid by the Government for its use be fixed by a judicial decision, and not by the *ipse dixit* of the Government.

Senator Casserly—Do I understand you correctly, that if the Philadelphia, Wilmington & Baltimore Railroad should refuse to carry the mails, the Government would have a right to take possession of it?

Mr. Cuyler—You do. I hold that the right of domain covers everything, corporeal and incorporeal, which the Government may need for its use. I can conceive of nothing which it may not take—not through any department, but through the judicial decision of a court.

Senator Casserly—This is a new and startling proposition. Where do you get this power?

Mr. Cuyler—Under the provision authorizing the Government to establish post-roads. The old Cumberland road is a case in point, built as far back as 1806. The Government built the road, but took the land of private citizens and of the several States through which it passed. The property of any corporation may be taken as of any private citizen, but only on the payment of just compensation fixed by a judicial tribunal. The Government may take possession of a railroad for postal purposes, but it cannot enter into business as a carrier.

Senator Casserly—Do not the complications which would arise in the seizure of a railroad by the Government argue that it never was designed that the State should have such a power?

Mr. Cuyler—I cannot conceive of any limit to the powers of the Government to take what is necessary for exercising the rights and powers conferred upon it by the Constitution. We see its exercise in the establishment of navy yards; though by courtesy the consent of the State is asked. In taking the land necessary for the navy yard, near Philadelphia, the Government asked the State, and the latter exercised the right of domain, though I have no doubt the National Government would have had a right to do so if it had chosen.

Senator Casserly said he had not intended to open so large a question. He did not think the power to open a post-road could authorize the Government to take possession of the Pennsylvania Central Railroad and keep it until it could compel the company to accept its terms.

Mr. Cuyler—The Government can seize nothing of the road except its postal service. It cannot engage in the business of carrying freight or passengers. It can only take its postal uses.

Senator Casserly—How could it take the road with its immense appendages, etc., without doing anything except carrying the mails?

Mr. Cuyler—This must be decided by itself. I can't conceive of such a necessity's ever arising; but, if it should be found necessary for the performance of any of its distinctly prescribed duties, I cannot conceive that it would not have the power. For example, in war the Government would have a right to seize railroads for carrying soldiers and munitions of war.

Senator Casserly—It would do this under the war power. No one disputes such a right.

Mr. Cuyler—Those powers were conceded because they were necessary in carrying on war. Government has the same powers in time of peace, to carry on the duties of peace. But, during the war, the right of the Government to fix the compensation for such use was not raised. I hold, first, that the Government is one of limited and prescribed powers; second, that it may do anything necessary to carry these powers into effect; and, third, that those powers should be construed with great liberality. The manner of their exercise is a proper subject of legislative action, which may in its turn be reviewed by the courts. The seizure of a railroad would be a question of policy as well as one of law. The general principle for which I contend is that the Government has every power necessary for carrying out its specifically granted powers. What it may do under any special circumstances, it is the province of the law-making power to decide.

Senator Casserly—Then it all comes back to this: that the Government has the same rights as a private individual, and may compel the railroads to concede those rights through the courts.

Mr. Cuyler—Exactly. The company cannot refuse to carry any person or anything. It can claim reasonable and equal compensation.

To a question by Senator Casserly, Mr. Cuyler replied that in his opinion Government may exercise a greater control over mail-carrying ships than over corporations deriving their existence from States. It may do this under its powers to regulate commerce, and may prescribe conditions on which certain rights and privileges may be granted—the advantage of the navigation laws, port entries, &c.

Senator Davis—When may Government take possession of a railroad? Before or after the rate of compensation has been fixed by judicial decision.

Mr. Cuyler—The laws on this subject vary in the different States. There being no United States law, it would be the duty of Congress to settle the question, but the compensation must be decided by the judicial power, not the executive or the legislative. It is, as I understand it, a part of the incidental powers of Congress. If the Government has the power to take property, it may take franchises, which are only a species of property.

Jumping on and off Cars while in Motion.

There is a good deal said, says the Danbury *News*, in censure of the custom of jumping on and off cars when in motion. It is righteous condemnation, but is not consistent when coming from the railroad companies. If they truly desire a reform they must begin at home, for as long as employees will jump on a train when in motion, and persist in doing it as gracefully as they do, an imitative public will be the sufferers. People don't jump on the train before it stops because they are in a hurry, but because they have seen a brakeman or conductor do it some time, and have a terrible dread of being surpassed. Now, at the station the other day, Conductor Phillips, of the eastern train, after giving the word to start, waited until the last car reached him, and then, raising one hand to the rail and one foot gently from the earth, he swung majestically round, and was at once firmly on the car. Mr. Phillips weighs 200 pounds but there was such grace and poetry in his motion that he seemed to blend with the car. First there was yellow paint, and then gold leaf and maroon and Phillips. There was an elderly person who saw Phillips do this, and his eyes glistened with anticipation. He was going on the western train, and when it came along he waited until a fine rate of speed was gained, and then raising his hand and leg, just as he had seen Phillips do, and looking carelessly away, just as Phillips did, he reached out for the rail, and the next instant was trying to push his head through the platform planks, and fighting the air with his heels, and madly pawing around with his hands, and swearing and praying at an awful rate. They stood him up on his feet, and rubbed his head with some snow, but it was a long while before they could convince him that the locomotive had not exploded.

An Extraordinary Engine.

The Boston *Advertiser* thus describes a new locomotive:

"The Hartford, Providence & Fishkill Railroad Company are building a new passenger engine, to weigh about 60,000 pounds, with a six-inch cylinder and twenty-two inch stroke. The driving wheels are to be five feet in diameter."

The New York *Evening Post* notices what we suppose is the same locomotive thusly:

"The Hartford, Providence & Fishkill Railroad Company are building a locomotive which, for a passenger engine, is of remarkable size. It is to weigh sixty thousand pounds, and will have a sixty-two-inch cylinder and twenty-two-inch stroke. The driving wheels will be five feet in diameter."

Our contemporaries are requested to inform the world whether this remarkable machine has *six* or *sixty-two*-inch cylinders. It may be a mistake of the printer's, and the engine may have six two-inch cylinders.

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CONTENTS.

	Page
ILLUSTRATIONS:	
Patent Shear and Punching Machines	155
Brace in a Howe-Truss Bridge	155
Track and Track Foundations for Railroads	156
End Areas	156
CONTRIBUTIONS:	
To Find Length of Brace in a Howe-Truss Bridge	155
The Care of Steam Boilers	155
Proposed Improvements in Track and Track Foundations for Railroads	156
Calculating End Areas	156
The Brotherhood of Engineers and Strikes	156
Limitations of a "Universal" Rule for Computing Cross-Sections	157
The Question for Scientists	157
Delinquencies in Paying Employees	157
EDITORIALS:	
Railroad Construction in '73	158
Freight Rates Westward	159
Annual Conventions	159
Record of New Railroad Construction	159
EDITORIAL PARAGRAPHS	159
GENERAL RAILROAD NEWS:	
Elections and Appointments	161
Personal	162
Traffic and Earnings	162
Scrap Heap	162
Old and New Roads	162
MISCELLANEOUS:	
Hornig's Patent Shear and Punching Machines—Single Lever Construction	155
Railroads as Post Roads	157
Improvement and Trial of the Westinghouse Air Brake	159
The Policy of the Illinois Railroad Companies	160
The Farmers' Clubs and the Railroads	161
Locomotive Returns	164

Editorial Announcements.

Removals.—The Chicago office of the RAILROAD GAZETTE *has been removed to No. 77 Jackson street, opposite Third avenue.*

The New York office of the RAILROAD GAZETTE *will be at Room 131, No. 73 Broadway, opposite the upper elevator landing, on and after April 14.*

Correspondence.—We cordially invite the co-operation of the railroad public in affording us the material for a thorough and worthy railroad paper. Railroad news, annual reports, notices of appointments, resignations, etc., and information concerning improvements will be gratefully received. We make it our business to inform the public concerning the progress of new lines, and are always glad to receive news of them.

Articles.—We desire articles relating to railroads, and, if acceptable, will pay liberally for them. Articles concerning railroad management, engineering, rolling stock and machinery, by men practically acquainted with these subjects, are especially desired.

Inventions.—No charge is made for publishing descriptions of what we consider important and interesting improvements in railroad machinery, rolling stock, etc.; but when engravings are necessary the inventor must supply them.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

RAILROAD CONSTRUCTION IN 1873.

It is beginning to be evident that we shall not construct so many miles of new railroad this year as we did last or the year before, and probably very much less. The causes generally assigned, and which doubtless are the proximate causes, are the great increase in the cost of iron, adding materially to the necessary expenditure, and, more especially, the closeness of the money market, which for some time has almost put an end to the sale of the securities of the most promising enterprises. The latter has been aggravated by the distrust in American securities which has been occasioned by the failure of a few of our companies to pay their interest. Money is not to be had, and more money than usual is needed to build a railroad, and these may be thought reasons enough for a decrease in the amount under construction. But there are other reasons which are quite as telling, and indeed go back of the difficulty of borrowing money.

As we have said so often, and as the public—especially the lending public—is beginning to find out, very little indeed has been paid by individuals for the stock of our newer railroads. The only considerable stock subscriptions actually paid in have been made by municipalities; but these have been made to the amount of many millions in the aggregate, and municipal aid has also been granted in other ways which left the municipalities not even stock to show for it. To a very large extent, especially in 1869, 1870 and 1871, these municipal subscriptions formed almost the only basis of the schemes to which they were subscribed. They were in some cases equal to $8,000 or $10,000 per mile, or even more, and with such subscriptions it was usually easy to borrow $20,000 or more per mile on mortgages. The municipal subscriptions were offered and taken as evidence that the road was needed and would be supported—though they were only evidence that many of the people on the line thought that their property would be enhanced in value by such a road, such people being almost always utterly incompetent judges. With the municipal subscriptions and the proceeds of the bonds the company would be able to complete its line, and usually to equip it lightly also.

There have been, too, a large number of roads whose construction was made possible by large grants of government land. The aggregate length of the lines which have received land grants is very great, and a large proportion of them were constructed within the last four or five years. There are some land grants remaining, but comparatively few, and most of these are in remote districts, where they add little, at present at least, to the resources of the companies. Very few have been granted of late years, and the fact that construction has been delayed for several years on a land-grant road is usually pretty good evidence that its grant is not very valuable, especially for the past three years, when it has been so easy to raise money for any road with a tolerable basis—and for some with scarcely any.

So we may say that a very large part of the recent extraordinary activity in railroad construction has been due to the popular feeling in favor of railroad extension, which has resulted in vast governmental subsidies of various kinds, from almost all of the various political divisions of our country, from the General Government, whose subsidies, except in the case of the first Pacific railroads, have been in the form of vast land grants, more or less valuable, to counties, cities and towns, which have given their aid in very various forms, sometimes by subscribing their bonds for stock, sometimes by absolute gifts of bonds, sometimes by gifts of right of way, depot grounds, etc.; but usually with the understanding that the sole consideration remaining to the municipality should be the advantage accruing from the new railroad.

Now, on the frontier, in districts absolutely without accessible transportation routes, this feeling has resulted from the desire to make new territory accessible and available for cultivation; but in by far the largest part of the country it has been caused by the desire to increase the value and profits of land already utilized by reducing the cost of transportation. This, somehow, was to be effected by the multiplication of routes. We believe we may safely say that this feeling exists no longer in its strength—at least, is much less demonstrative than formerly. It has caused the construction of thousands of miles of new road, and the effect, except in comparatively few instances, has not been what was promised. In a very large number of cases the new roads have had to inflict the highest possible tariffs in order to pay their own working expenses and keep out of bankruptcy; and where there have been general reductions of rates, the initiative has usually been taken by the older lines, as the result of an increase of traffic from new connections. Meanwhile the land grant roads on the frontiers have enlarged the productive area of the country, brought new regions into competition with the older agricultural districts with artificial rapidity, and the total production has been increased so much more rapidly than the demand that prices of many staples are greatly reduced, and the cost of transportation is consequently a much larger proportion of the price than heretofore.

No consideration of our recent railroad extensions can escape gross error which fails to observe that only a small part of the new mileage furnishes channels for new productions. Most of the new roads simply carry what other routes would have carried had they not existed, not staples which otherwise would not have been produced. All of them, doubtless, have lessened more or less the amount of hauling from the farm to the railroad, but not many east of the Mississippi have so greatly reduced this labor as to cause an increase in production. Not that production has not increased: it increases almost continually throughout the Mississippi valley, from year to year, whether or no there is a rapid increase in railroad mileage.

Another important consideration not sufficiently taken into account is the fact that the roads, old and new, are nearly all capable of carrying a vastly larger traffic than they receive. If the increase in mileage had been only one-fifth as great as it has been during the past four years, our railroads would have been abundantly able to carry all the existing traffic, with only an increase of rolling stock and a few improvements of permanent way which would have been trifling in comparison with the cost of the new railroads.

The idea that a multiplication of routes will cause a reduction of rates is a popular error—not so popular now, probably, as it was a year or two ago—and can be true only where the demand for transportation largely exceeds the facilities, and the profits are exceedingly large: and not always then; for the traffic which may crowd one road, and give it a profit of 20 per cent., if divided between two roads must pay much greater working expenses as well as the interest on two capital accounts, and at the same rates of fare and freight may not pay 7 per cent. on the capital invested. Generally a reduction in the prices of transportation can be reached only by a reduction of the cost to the carrier; and a reduction in the cost of transportation is attained by the concentration of traffic, and not by its division. The practical teaching of this truth by very costly experiments has something to do, doubtless, with the decrease in the popular favor towards new railroad schemes, which of late years has permitted if not compelled the liberal subscriptions and guarantees of towns, cities, counties and States, and the princely endowments of lands by the General Government.

Not that these subscriptions have wholly failed of the effect hoped for when they have not caused a reduction of transportation charges. Usually they have favorably affected the price of real estate in the more immediate vicinity of stations, even when not making its productions more profitable, partly because of certain conveniences much appreciated by well-to-do farmers, and largely because of the hope of future advantages.

Perhaps quite as effective a cause of the cessation or diminution of municipal aid to railroads through popular favor is the fact that most parts of the country with considerable population, wealth and traffic are already well supplied with railroads, and many parts more than supplied. The communities which were crying out for new railroads and "competing lines" a few years ago have largely got what they were asking for, whether or no it has been as beneficial to them as they expected. If it has been, they are satisfied; if it has not, they are not likely to try again the plan that failed. Some people talk of railroads as if they were standard articles of consumption, like food and clothing, supplies of which in any given territory must be obtained yearly forever. Transportation facilities—not railroad mileage, by any means—should increase with traffic; and in most of the States these facilities may be doubled or trebled or quadrupled without the addition of a mile of new line, chiefly by additions to equipment, and partly by some second tracks, new sidings, and terminal facilities. The facts of growing wealth, population and traffic are not enough of themselves to indicate the necessity of new railroad lines. Such a necessity must be discovered by a special study of each case.

We would not be understood as saying that no new roads are now needed; or that there will not be hereafter many favorable opportunities for constructing railroads which will be profitable alike to their owners and to the communities which they serve. But we have no doubt that we have been building railroads too fast—the mileage of the country increasing by about 13 per cent. yearly, while the increase in population is not more than 4½ per cent.—that many of the newer lines will be unprofitable at once to their owners and to the community; and that the late construction of railroads in advance of the demand is likely for some time hereafter to cause unusual stagnation in railroad construction—that is, as compared with recent years. It is too early yet for any general activity in the field, but we do not hear the usual notes of preparation, and even companies which have lines to complete are many of them delaying work.

We shall have some important works this year, but fewer long lines than usual, apparently. The Texas & Pacific is likely to make the most progress, having now several hundred miles of line well under way, and, it is said, most of the material secured. The Northern Pacific does not promise more for this season than the completion of the line to the Missouri and the extension of the Pacific Division to Puget Sound—which is, perhaps, the wisest course that could be pursued, however easy it might be to raise money. The Baltimore & Ohio promises to complete a large part of its Chicago line. Several companies which have begun work on considerable lines are trying industriously to sell bonds enough to enable them to complete them. As our weekly record shows, work is by no means abandoned and new enterprises still abound. Doubtless we shall have a large amount of new road at the close of the year, small only in comparison with the enormous mileage of the past few years.

But there is other work in construction, calling for vast expenditures of capital and demanding immense quantities of labor and material, which is likely to be greater this season than ever before, if the money can possibly be obtained. This is in the improvement of old lines, and especially of the trunk lines between the East and the West. The doubling of the tracks of the Pittsburgh, Fort Wayne & Chicago, the Lake Shore & Michigan Southern, the Michigan Central, the Great Western of Canada and the Erie, the freight tracks for the Pennsylvania and the New York Central, the narrowing of the gauge of the Erie and similar improvements, which promise to increase vastly the capacity of the chief channels of traffic and the economy of their operation, are likely to be more important in their results, to the community at least, than the construction of thousands of miles of new line. Railroad improvement, not railroad extension, is the necessity of the time, and any decrease in the latter, if balanced by an increase in

the former, is to be welcomed and encouraged, not lamented.

Freight Rates Westward.

The rates westward by the trunk lines—Pennsylvania, Erie and New York Central and Hudson River—have been revised, as usual in the Spring, and the new rates went into effect on the 14th. These are considerably lower than the Winter rates. The latter has been in force with great regularity for just six months. The new rates from New York to leading points are:

	1st class.	2d class.	3d class.	4th class.	Special.
Chicago	100	90	75	60	45
Cincinnati	92	83	70	55	41
Columbus	80	72	60	48	36
Detroit	70	63	53	42	32
Indianapolis	95	85	71	57	43
Milwaukee	100	90	75	60	45
Omaha	175	155	130	110	95
St. Louis	128	116	97	79	61
St. Paul	180	160	125	95	80

The winter rates were:

	1st class.	2d class.	3d class.	4th class.	Special.
Buffalo	85	65	60	40	30
Chicago	125	110	85	65	50
Cincinnati	115	101	78	60	46
Columbus	101	88	68	52	40
Detroit	88	78	60	46	35
Indianapolis	118	104	80	62	47
Kansas City	200	170	140	105	87
Milwaukee	125	110	85	65	50
Omaha	210	175	140	115	100
St. Louis	158	141	110	85	67
St. Paul	240	205	155	115	100

First-class rates are reduced 25 per cent. to St. Paul, 12½ per cent. to Omaha, and 20 per cent. to the other places named. Second-class rates are lower by 22 per cent. to St. Paul, 11½ per cent. to Omaha, and 18 per cent. to other places. Third-class rates are less by 12 per cent. to Chicago, Columbus, Detroit, Milwaukee and St. Louis, 10 per cent. to Cincinnati, 11 per cent. to Indianapolis, 7 per cent. to Omaha and 20 per cent. to St. Paul. The reduction in fourth-class rates is 7 per cent. to St. Louis, 18 per cent. to St. Paul, 4½ per cent. to Omaha and 8 per cent. to the other places. In special rates there is a decrease of 5 per cent to Omaha, 20 per cent to St. Paul, and to the other towns 9 or 10 per cent.

The new rates are very nearly the same as those of last year, and there seems to be little reason why they should not be maintained as well as they were last year. Very little complaint is made against rates in this direction, they being kept at very low figures by the excess of the supply of transportation over the demand, it being impossible by any rates which will pay for loading and unloading to get freight enough to fill the cars that come east loaded. The best opportunities for increasing earnings in this direction is probably in sundry special freights, in which by very low rates a considerable trade may often be cultivated; and in this case it is not necessary that the traffic should pay expenses in order to be advantageous, but only that it should pay more than the difference between the cost of empty and loaded trains. The Erie has recently, we understand, secured a considerable coal traffic to Lake Erie for its empty coal cars, and the Fort Wayne for some years has utilized its stock cars in this way on their way to Chicago from Pittsburgh. As things are the eastward traffic has to bear the largest part of the cost of transportation, and it always must until the amounts of the traffic in the two directions are more nearly equal. But we believe there are no signs of such an equalization. On the contrary, a diversion of a considerable part of the grain traffic from the lakes to the railroads will increase the discrepancy. This inequality between the amounts of the traffic carried east and west, and the consequent depression of rates in one direction have an important effect on many industries, and doubtless modify to a considerable extent the condition of both East and West.

Annual Conventions.

The following societies will hold their annual conventions at the time and places named:

The American Railway Master Mechanics' Association, in Baltimore, beginning May 13.

The Railway Association of America, at the St. Nicholas Hotel, in New York, on the 14th and 15th of May.

The American Society of Civil Engineers, on the 21st and 22d of May, in Louisville.

The Master Car Builders' Association, on the 11th, 12th and 13th of June, in Boston.

Particular attention is called to the Master Mechanics' meeting, which we have heretofore announced as beginning May 6, as was announced also on the cover of the report of the last convention.

Record of New Railroad Construction.

This number of the RAILROAD GAZETTE has information of the laying of new track on railroads as follows:

Missouri, Kansas & Texas—Northern Extension.—Tracks laid from Sedalia, Mo., northeastward 31½ miles. *Southern Pacific of California.*—The track has been extended on the *Salinas Branch* for 17 miles southward, to a point near Soledad Crossing.

This is a total of 48½ miles of new railroad.

ANGLO-AMERICAN RAILROAD MORTGAGE TRUST is the name of an association recently organized in London which has, we believe, no equivalent in plan and purpose in America, though similar organizations are known in European financial centers. Briefly we may say it is a combination of investors who, instead of holding each a bond or a few bonds of one railroad company or two, buy and hold in common a large number of the bonds of a large number of companies; so the chances of a failure of payment of interest or principal are divided, and the investors may be said to insure each others' investments. Let us suppose, for instance, that a thousand men in Germany who were about to put a million dollars in American securities—some in Central Pacific, some in Rockford, Rock Island and St. Louis, some in St. Louis & Southeastern, and others in half a dozen other companies' bonds—had "made a pool" of their million dollars and bought amounts of the nine companies' bonds, the payments on which should be divided in proportion to the subscriptions. Then when Rockford, Rock Island & St. Louis failed to meet its interest, instead of an utter failure of income to one-ninth of the investors (if the investments were equal in all the companies), there would be only a decrease by one-ninth in the amount of the dividend, which would leave still a good interest on the investment; St. Louis & Southeastern, Central Pacific and the six good companies remaining to fill the treasury of the associated investors. So in this way the man who has only money enough to buy a single bond may have the diminution of risks which the capitalist gets who can buy twenty and buys those of twenty different companies. This may not be a very valuable privilege to one who is able to judge accurately of the value of railroad securities; but the number of these people is not great, even among those familiar with the lines mortgaged, and of course in England a small investor could hardly know anything of the real value of American bonds. The association should give him the advantage of an enlightened supervision in making the investments, as well as the diminishing of the risks by the number of them.

The "Anglo-American" is to have a capital of one million pounds sterling, in certificates of £100 each, with quarterly coupons at the rate of 6 per cent. per year. The price of subscription is to be £85 per certificate, so that the coupons will be at the rate of 7 per cent. Not more than 10 per cent. of the whole capital is to be invested in any one mortgage. Any surplus income will be devoted to redeeming the certificates at par annually.

Of course the success of the enterprise must depend upon the wisdom with which its investments are made. It can, doubtless, find paper enough to absorb its ten millions such as will make a sorry showing for the investors in the course of a few years; but it ought to be easy, with the advice of experts and reasonable intelligence in selecting securities, to make a most excellent showing for them: which also, by the way, would be an excellent thing for the United States, and help us to a good credit in England, which we much need and have not got.

The Trust has a "New York Committee," composed of Mr. Philo C. Calhoun, President of the Fourth National Bank, Mr. Henry Clews and Mr. William Lamont Taylor. One of the "Certificate-Holders' Committee" is Mr. Claudius E. Habicht, of the London firm of Clews, Habicht & Co.

THE *Nation*, in an article which we reproduce elsewhere, has something to say of the anti-railroad movement among the Illinois farmers, which shows that it sees below the surface and understands somewhat the complications of railroad business. It will be seen that it acknowledges that variations in the rates of profit are largely due to the irregular competition which in the present condition of things is inevitable, and which most States and publicists have felt it their duty to encourage to the utmost. It also sees that in existing circumstances smaller transportation charges would have little effect on the price of grain received by the farmer, the great reduction having been caused by over-production, and the supply being so much in excess of the demands of consumers that the latter would be sure to get all or nearly all of the benefit of any decrease in transportation charges. What it has to say of abnormal means by which this over-production has been caused—largely by encouraging and aiding new railroads in unoccupied districts with the intention of benefiting the very classes who now feel most oppressed—is well worthy of attention. It might also have truly said that the reduction of rates on the older railroads might have been and doubtless would have been more rapid but for the multiplication of new lines in districts where they opened no new territory to cultivation—and most of our new railroad mileage within the past two or three years has been of that character. That is, the cost of transportation on any line is inversely as the amount of the traffic; or, the greater the traffic, the less the cost. So anything which prevents the increase of traffic, or makes the increase less than it would have been otherwise, is an obstacle to the decrease of the cost of carriage.

The *Nation* believes that the evil of discriminating rates, which are forced upon railroad companies by the irregular competition to which they are subject, is so great and so strongly felt as make it fitting and probable, not that tariffs be fixed by law, but that there should be such a reorganization of the whole railroad system as shall make it free from the spasmodic and local competitions which now affects it. Just how this is to be done we are not told, but we infer that the scheme of the Massachusetts Commissioners is favored as likely to solve or help to solve the problem.

THE "SELECT COMMITTEE" of the Illinois Legislature appointed to devise a new railroad law when it became evident that the one proposed by the regular Committee on Railroads and that passed by the Senate could not pass, has reported a bill in thirteen long sections, the purport of which is as follows: Greater charges for carrying any distance than are made for carrying an equal or greater distance in the same direction from the same station are declared *prima facie* evidence of unjust discrimination, the penalty for which shall be a fine of not less than $1,000 or more than $5,000 for the first offence, $5,000 to $10,000 for the second, $10,0000 to $20,000 for the third, and for every subsequent offence $25,000, and the person who has suffered from the extortion or unjust discrimination may recover three times the amount of his damages, with costs. It is made the duty of the Railroad and Warehouse Commissioners to commence suit under the law upon due notice that any company has violated the law, and they are authorized to employ counsel to conduct it. The Commissioners are directed to make for each railroad company a schedule of reasonable maximum rates for the transportation of passengers and freight, and any charges in excess of these rates are to be taken as *prima-facie* evidence of extortion. These rates may be changed and revised from time to time, at the discretion of the Commissioners. Annual reports of the Commissioners are made *prima-facie* evidence of the truth of the statements therein contained.

THE COLOR OF SIGNALS is a very important matter. There was recently a collision at Tivoli, N. Y., on the New York Central & Hudson River Railroad, in which one express train ran into another, though signals were set to stop it. This signal was the usual red danger signal, and a brakeman was also sent toward the approaching train with a red flag. The testimony at an inquest over the body of a fireman who was killed showed conclusively that these signals were set, but the engineman of the train which was struck gave other testimony, which is worth careful consideration. He said: "When the snow is on the ground and the sun shining you can't tell whether a flag is red or white till you get right on to it."

MR. MATTHEW BAIRD, since the death of the late Mr. M. W. Baldwin, the senior partner in the proprietorship of the Baldwin Locomotive Works, a partner in the firm since 1854, and for eighteen years before that time one of the foremen of the works, has retired from the business, having sold his interest to the other partners, who will hereafter carry on the business under the firm name of Burnham, Parry, Williams & Co. A service of thirty-seven years in one establishment is not so common in this country as to be unnoticeable. It is especially remarkable in the manufacture of railroad machinery—an industry very little older than Mr. Baird's service in it.

"STONEY ON STRAINS" has been advertised in our columns recently as for sale by Mr. Van Nostrand at *five* dollars per copy, instead of fifteen, which is the real price. The neglect to make a figure 1 before the 5, in copying, has caused Mr. Van Nostrand to receive sundry orders inclosing five dollars in payment for the fifteen-dollar book—which is unprofitable, exceedingly.

Improvement and Trial of the Westinghouse Air Brake.

The demand for and necessity of having some more efficient means of controlling the motion of railroad trains than ordinary hand brakes has excited considerable rivalry among inventors and a good deal of inquiry among railroad managers regarding the efficiency of what are called automatic brakes. This desire for more definite and accurate knowledge of the efficiency of the two systems of operating brakes which are now most prominently before the public—the Westinghouse air and the Smith vacuum brakes—we presume was the motive which suggested the following letter:

BOSTON, March 17, 1873.

Chas. F. Haich, Esq., Gen. Manager Eastern Railroad, John B. Winslow, Esq., Supt. Boston, Lowell & Nashua Railroad.

GENTLEMEN: As there has been considerable controversy as to the relative power and utility of the Westinghouse and vacuum brakes, we, the undersigned, respectfully request that you will accord to us the privilege of witnessing a comparative test between these inventions, and that a public exhibition of the same may be given on the Eastern Railroad at such time as may be mutually convenient, and within the next fourteen days.

We suggest that at least ten cars be used on each train in said trial. As this is a question the solution of which is of such importance to the railway interest and the public generally, we trust you will give us the opportunity to satisfy ourselves as to the efficiency of each of these appliances.

A. A. FOLSOM,
Supt. Boston & Providence Railroad.
J. P. KENDRICK,
Supt. Old Colony Railroad.
WM. M. PARKER,
Gen. Supt. Boston, Hartford & Erie.
D. WALDO LINCOLN,
Vice-President Boston & Albany Railroad.
JAMES T. FURBER,
Gen. Supt. Boston & Maine Railroad.
A. FIRTH,
Supt. Marginal Railway.
C. L. HAYWARD,
Supt. Fitchburg Railroad.
A. D. BRIGGS,
For Board of Railroad Commissioners.
E. P. CARPENTER,
Chairman Senate Railroad Committee.

It should perhaps be explained that the Westinghouse brake is in use on the Eastern Railroad, of which Mr. Hatch is the General Manager, and the vacuum brake on the Boston, Lowell & Nashua Railroad, of which Mr. Winslow is the Superintendent.

To the above letter Mr. Hatch replied that the Westinghouse Air Brake Company were desirous of having a trial and that if Mr. Winslow would advise him what day he would have a train of ten cars equipped with the vacuum brake ready, he would furnish a similar train with the air brake, and that the trial could be made on the Eastern Railroad track. On the 21st of March Mr. Winslow replied to the letter that "We should be pleased to afford every opportunity to the gentlemen petitioners to examine the working of the vacuum brake on the trains that have been fitted with it on this road, and will attend to them separately or collectively at any time when they may wish to make the examination; but we are not yet in a situation to make up a train to send off our road for such a competition as you advert to. I will, however, forward your communication to the Vacuum Brake Company, and in case they approve of and are prepared to make the experiment proposed, we will lend every aid in our power." On the 25th of March Mr. Folsom, Superintendent of the Boston & Providence Railroad, wrote to Mr. Winslow expressing regret that he could not afford them the gratification of a trial, and hoped that their letter would be forwarded to the Vacuum Brake Company, and offering to have

the trial made on the Lowell Railroad if more convenient to those interested in the latter brake. Mr. Winslow replied to Mr. Folsom on the 27th of March as follows: "We shall have a train out next week, of the vacuum brake, and shall be pleased to show its operations to you or any person who may wish to see it operate. I am strong in the opinion that the only way you can be satisfied is to have a train fitted up with the vacuum brake (take one of your short trains that the cars are kept together): you will be able to try any experiment that is desired, and after using a number of months will be able to judge without outside interference."

We are thus explicit in describing the "genesis" of this trial because it attracted a great deal of attention, and has been the subject of extended comment and discussion among railroad men and those interested in the patents of the two brakes referred to.

Before describing the trial, we will state that a number of improvements have been added to the Westinghouse brake to increase its efficiency, safety and certainty of operation. We expect in a few weeks to give elaborate engravings of these improvements; but that our readers may have some idea of their nature, we copy the following description from a very neatly-printed pamphlet issued by the Westinghouse Air Brake Company:

THE WESTINGHOUSE AIR BRAKE FURTHER IMPROVED.

"The Westinghouse air brake has now been in extensive use for three years, * * and while it constituted, when it was introduced, an immense stride toward perfection in railroading, it has by its author been still further perfected by the introduction of additional improvements, by which it is believed every contingency is amply provided for. Nearly all these improvements have been thoroughly tested on a running train for the past four months, and such tests have demonstrated that the following ends can be perfectly secured on a train of any practicable length:

"1st. A great saving of time in getting the brakes fully on, as compared with the old plan, or the plan or system now in general use.

"2d. An accident to the apparatus, such as the bursting of a pipe on any part of the train, results automatically and almost instantaneously in the application of the brakes to the whole train.

"3d. The same result follows when a car leaves the track, or the train breaks in two, and at the same time a signal is automatically given to the engineer.

"4th. It is in the power of the conductor to apply or release the brakes and signal the engineer from any car in the train.

"5th. Signals can be accurately and rapidly given the engineer from any part of the train by devices readily accessible to the officers of the train, and the bell cord is then dispensed with.

"6th. Two distinct ways of applying the brakes are furnished, by which greater security is attained.

"7th. These improvements are readily applicable to the apparatus as now in use, and are merely an addition thereto.

* * * * * * * *

"A separate line of half-inch gas pipe, provided with a three-way cock on the engine, extends from the main reservoir back under the whole train. This pipe is, between the cars, provided with flexible sections, on the outer ends of which are couplings which are counterparts or duplicates of each other. These couplings have no valves for retaining, when uncoupled, the compressed air, but a cock is inserted in the pipe at or near the end of each car, for closing the pipe at the rear end of the train. A reservoir having about four times the capacity of the brake cylinder is arranged under each car. A branch pipe leads from the half-inch pipe to each reservoir. In the line of this branch pipe, a valve box is arranged, which contains a tripie valve of peculiar construction, but which operates automatically in effecting the desired results. A pipe also leads from this triple valve case to a double-ended check valve and case, which latter is arranged in the branch pipe, which in the apparatus now in use connects the brake pipe and brake cylinder. This double-ended check valve is so constructed that air pressure applied to it from the half-inch pipe closes communication with the old pipe, and *vice versa*. The triple valve is so constructed and arranged in its case that compressed air admitted therein from the half-inch pipe passes through freely to the reservoir, but, by the automatic closing of one of the triple valves, is cut off from the pipe which leads to the double-ended valve. Hence, while the reservoir under each car is thus charged and kept charged with compressed air by means of the half-inch pipe, none is allowed to enter the brake cylinder. And the more surely to keep the brake cylinder free from all but atmospheric pressure while the train is running, a discharge port is made in the side pipe which leads to the double-check valve, and which is always open when the brakes are off.

"Now to apply the brakes, the engineer turns the three-way cock of the half-inch pipe, so as to allow air to escape therefrom. The instant the pressure is thus reduced, the back pressure of compressed air in the reservoirs under the cars shifts each triple valve so as to close the communication with the half-inch pipe, close the cylinder discharge, and uncover the port, which, by the side pipe, leads from the triple-valve case to the double-ended valve, and thence to the brake cylinder. The compressed air instantly and simultaneously rushes from the reservoir to the brake cylinders, and the brakes are then applied. To let off the brakes, the three-way cock is brought back to its original position. The compressed air, passing back through the half-inch gas-pipe, shifts the triple valve over, so as to cut off communication from each reservoir to its brake cylinder, recharges the reservoirs and reopens the cylinder discharge ports, whereby the brakes are released.

"As the triple valve is shifted in these operations by the difference of pressure acting from opposite directions, a very slight increase or decrease is sufficient. But the chief advantage is in the quickness with which the brakes can be applied. In the system heretofore in use, the pressure has to be transmitted back through the train. In the improvement just described, the requisite pressure is kept up throughout the train, ready to be put into operation. In the former case 1,200 cubic inches of compressed air at 35 lbs. pressure per square inch for each car, or 2,800 cubic inches at atmospheric pressure, have to be transmitted back from car to car to apply the brakes effectually. In the latter case, a reduction of 15 lbs. in the pressure is all that is necessary to effect the same result. This reduction of pressure is equivalent to the transmittal of 180 cubic inches of air at atmospheric pressure. The saving of time in applying the brakes will then be in the proportion of the quantity of air transmitted, or as 2,800 is to 180. Carefully-made tests demonstrate that, by the use of this instrument, the brakes can be fully applied on the last of a train 900 feet long in about two seconds, and on the first car instantaneously: average loss of time for an entire train of thirteen passenger cars, only one second; and every second saved, with a train running at forty miles per hour, represents 58⅔ feet, or over a car's length.

"Since the brakes are applied by or as a result of the discharge of air from the half-inch pipe, it is evident that the brakes will be immediately and automatically applied as a result of the bursting of the pipe, or the breaking in two of the train, or other like accident.

"To secure automatic application of the brakes when a car leaves the track, a tripping valve or cock is arranged in the half-inch pipe, with a port leading thence by a cross pipe to the present brake pipes. By means of a catch, spring and tripping rod, which latter extends down nearly to the track, provision is made such that when a car leaves the track, the valve or cock last referred to will be shifted so as to admit compressed air from the half-inch pipe to the present brake pipe. The lowering of the pressure thus affected in the half-inch pipe applies the brakes as above described; and at the same time the compressed air thus discharged into the old brake pipe passes forward to the locomotive, where it blows a whistle or gives any other desired signal to the engineer. But the connections are such that the whistle is not blown when the old or present brake pipes are in use for braking purposes in the way now generally practiced. For it will be observed that the improvements above described do not interfere with the mode of braking now in general use. Either mode can be adopted at pleasure, and if one set of pipes breaks, the other is perfectly serviceable.

"To enable the conductor or other employee of the road to apply the brakes from any car, a cord or rod leads from each tripping valve into the car at any convenient accessible point. By pulling this cord or rod, the tripping valve or cock is shifted so as to open the cross communication from the half-inch pipe to the present brake pipe, which results, as before described, in lowering the pressure in the small pipe, applying the brakes, and signaling an alarm to the engineer. When the cord or rod is released, the valve is reseated by its spring, and the train is again in running order. If the cord be pulled and instantly released, the signal only will be given; and, in like manner, any desired number of or variation in signals may be given.

"It should be remembered that the small pipe mentioned is always in communication with the main reservoir on the locomotive, but by an orifice or port relatively so small that while, when the apparatus is intact, it will carry a constant and uniform pressure, still, when an accident occurs, or the cross communication is opened, it will discharge air more rapidly than receive it from the main reservoir, with the consequent result of reducing the pressure in the car reservoirs and applying the brakes as already stated.

"This apparatus now known as the "safety apparatus," has been fully tested, and with the most satisfactory results."

We omitted to state that the time fixed for making the trial of the Westinghouse brake was on April 9, and that invitations to be present at the trial were issued to most of the leading railroad men in New England. The trial was made on the East Boston Branch of the Eastern Railroad. The train consisted of eight eight-wheeled passenger cars, and a thirty-ton American locomotive. The cars and locomotive were equipped with the improved apparatus described above. The cars were all new, and the brake, which had just been applied, was in excellent order.

About two hundred people answered the invitation and assembled at the Causeway Street Depot, in Boston, at two o'clock on the day appointed. The distance from the depot to the junction with the East Boston Branch is nine miles, and the experiments were made very near to Revere, the scene of the melancholy accident which occurred a few years ago. This fact made the trial of the brake very impressive, and few, we believe, could help interrogating the past, in their thoughts at least, if not in their speech, with an interrogative "if?" which suffering human nature so often asks in vain.

On reaching the place selected for the trial a committee of six was appointed to make a report of the experiments. The members of the committee were Hon. W. R. Lee; Hon. George B. Loring, President Massachusetts State Senate; Hon. E. P. Carpenter, Chairman Committee on Railways; Hon. A. D. Briggs, Railroad Commissioner; Mr. A. A. Folsom, Superintendent Boston & Providence Railroad; Mr. C. W. Slack, Editor of the *Commonwealth*.

The report of the committee was as follows:

"BOSTON, April 9, 1873.

"The committee appointed by the assembly called together to witness experiments made with the Westinghouse air brake, on the Eastern Railroad, would respectfully report. The experiments were as follows:

"First—Stop made by engineer from a signal given in the cars by the conductor—distance measured from a flag thrown from the train at time of signal being given. The result of this experiment was: The train stopped in 15 seconds; the distance run from the flag was 512 feet; the velocity of the train was about 30 miles per hour.

"Second—First experiment repeated. Train stopped in 15 seconds; distance run from flag was 424 feet: the velocity of the train was 30 miles an hour.

"Third—Stop made by engineer by putting brakes on when arriving at a flag on marked point in the track; distance measured from that point. The result of this experiment was as follows: The train stopped in 15 seconds; the distance run was 415 feet; the velocity of the train was 34 miles per hour.

"Fourth—The third experiment repeated. Train stopped in 15 seconds; distance run was 445 feet; velocity, 34 miles per hour.

"Fifth—Stop made by putting the brake on from one of the cars; distance measured from a flag thrown off at the time of application. The result of this experiment was the stopping of the train, at a speed of 30 miles per hour, in 15 seconds.

"Sixth—This experiment was to be a repetition of the last and was omitted.

"Seventh—Stop made by putting the brake on from one of the cars; engine to remain wide open, working ahead with full steam on; distance measured as before. The result of this experiment was the stopping of the train in 21 seconds; the distance run from the flag was 685 feet, and the velocity of the train was about 30 miles per hour.

"No. 8 of the programme was omitted, being but a repetition of No. 7.

"Ninth—Stop made by brake working automatically by the train being cut in two and running at full speed. The result of this experiment was the stopping of the train in 13 seconds; the distance run from the flag was 73 feet; 270 feet remained between the parts of the train.

"Tenth—This experiment was to be a repetition of the last and was omitted.

"Eleventh—Stop to be made by breaking the engine from the train—the brakes working automatically. The result of this experiment was the stopping of the train in 17 seconds; the distance run from signal was 350 feet, and the velocity of the train was 35 miles per hour.

"These experiments were made under the influences of a strong northeast wind—blowing against the train during the first half of the trial and with the train during the last half. The train consisted of a locomotive weighing 35 tons, with a tender weighing 20 tons, and 8 cars weighing 128 tons. The number of passengers was about 200. The Committee desire to express their entire satisfaction with the trial of the brake, and to congratulate the community on the security produced by the invention. For the systematic manner in which the experiments were made, they also express their satisfaction."

With reference to this report it is but fair to say that the estimates of speed and weight of cars were but shrewd guesses as no instruments or appliances were used to determine either experimentally. The time of applying the brakes and coming to a full stop was taken with a stop watch, and the distance run was measured with a tape line by the engineer of the road. We are inclined to believe, however, that the speed run in miles per hour and the weight of cars was under and not over estimated. Some delay was occasioned after the fifth trial by the necessity for replenishing the locomotive tank with water. In the interval, considerable discussion was indulged in regarding the rate at which the speed of a train is retarded by the application of the brakes. We suggest the problem to those who delight in such calculations. All the elements are given in the report of the trial, excepting the pressure on the brake-shoe, which, with 70 lbs. per square inch in the reservoir, would be about 4,000 lbs. on each shoe and wheel of the cars and tender. In other words, if a train weighing say 400,000 lbs. is stopped in 15 seconds and runs 512 feet with a pressure of 4,000 lbs. on each brake-shoe (there being 72 in all), how fast was the train running when the brakes were applied? Allowance of one second should be made from the time the signal is given to the application of the brakes to the wheels.

That the speed was not very suddenly arrested was indicated by an experiment which was made on our own account in one of the cars during the fourth trial. The writer took from the fuel box a stick of wood, the section of which was nearly of the form of a sector of a circle, one side being 5½ and the other 4½ inches, and the piece 15 inches long. It was sawed off square at one end. This stick was set up on end on the floor, with the angle between the flat sides towards the front end of the car. It was not overturned by the checking of the speed of the train on the application of the brakes. The rate, however, at which the speed is retarded, whether in an arithmetical ratio or in some other proportion, is not apparent without more elaborate calculations or experiments than our time will now permit us to make.

Much admiration was expressed at the success of the experiments, and Mr. Westinghouse was frequently congratulated by those present.

After the trial all were invited to a dinner at the Revere House, to describe which adequately only the talents of a reporter of a daily paper would suffice. We therefore copy the following from the Boston *Post:*

"At a few minutes past six o'clock the company returned and sat down to a dinner at the Revere House, at which about two hundred gentlemen were present. The tables were laid in the style for which the Revere has long been noted, and the dinner was served under the immediate supervision of Mr. Gurney, who has the Revere in his especial charge; and it is not too much to say that the affair was one of the most elaborate that was ever spread under its roof. Geo. T. Towne, Esq., presided, and coffee being reached the health of Mr. Westinghouse was proposed and drank with all the honors, for which that gentleman briefly returned his thanks. President Loring was next introduced and read the report of the Committee appointed to superintend the experiments.

"Dr. Loring continued and spoke briefly of the great railroad interests of the country, and he was followed by Major Doyle, of Providence, who made a capital off-hand speech that elicited the hearty applause of his hearers. Mr. Williams, Managing Director of the Eastern road, responded for that corporation, and stated that experience had taught them that the Westinghouse brake was a very great invention. Rev. E. C. Bolles, of Salem, responded happily to a call; C. W. Slack and Curtis Guild, Esqs., responded for the Press; Senator Washburn and Col. Carpenter were next called upon, and during the balance of the evening various gentlemen responded to calls from the chairman, and it was not until a late hour that the company separated, after having enjoyed a very profitable afternoon and evening."

The Policy of the Illinois Railroad Companies.

The following striking communication was published in the Chicago *Tribune* last week, over the signature "A. D. C." The writer assumes to speak for the railroad companies, with what authority we do not know, but with a positiveness and definiteness which leads one to believe that he knows whereof he speaks. It is certainly a remarkable state of things when one of the leading industries of a great State should accept and obey laws almost universally believed to be invalid, for the sole purpose of demonstrating unmistakably the harmfulness of those laws. Doubtless such a policy would be effective with the existing laws and most of those proposed; but it might be terribly costly to the railroad companies as well as to the community:

To the Editor of the Chicago Tribune:

SIR: The railroad companies are not indifferent to the movement against them. They realize its threatening proportions, and are anticipating the inevitable collision. For a time they expect to suffer, but not alone. They have closely watched the progress of events; have seen how, by fervid declamation, an "irrepressible conflict" has been precipitated; and are not disposed to vainly attempt to stem the popular current. They are assured a stringent law will be passed at Springfield, and are putting forth no efforts to avert the blow. They propose to submit to it, and let the recoil knock into the heads of the agitators the wisdom they will not otherwise learn.

The time for calm reasoning has gone by. Denunciation is now the order. The branded "monopolies" are condemned without a hearing. With the exception of the mild statements of Messrs. Newell and Harris, the corporations have maintained complete silence. It was impossible to still the clamor, and they preferred to await the issue. Had they been otherwise disposed, it would have availed them nothing. The "people" would not have listened to them. Perhaps they will before the year has run out.

The railroad managers believe the best way to be rid of a bad law is to obey it to the letter. If a law is passed prohibiting discrimination, and enforcing a uniform rate per mile, their present intention is to observe it strictly. And, if six months' experience does not teach every business-man in the State the supreme folly of such legislation, and impel him to demand its immediate repeal, then the experts who have made these matters practical life-studies will be willing to yield the management of the roads to the farmers and ambitious spouters who are now so anxious to "regulate" them.

Any furious declaimer can mouth freely about confiscation and compulsion. Any hair-brained legislator can draw up a bill that would crush the life out of the weaker and cripple the stronger corporations. For which services, both would win admiration, perhaps distinction. But the man has not arisen who can judge unerringly between the oppressed and the oppressor, and relieve the abused by correcting the abuse.

No railroad expert denies the existence of abuses. In a

system that has grown so suddenly great, it could hardly be otherwise. Just as ailments creep into the physical system, they have insinuated themselves into the railroads; but no sane man thinks of curing a pain in the knee by amputating the limb. Yet the impetuous agitators of to-day would remedy the grievances by confiscating the roads. Some of the companies would be considerably relieved were the Government to buy them out. Such a result is not the worst that is threatened.

Discrimination is the chief complaint. At first sight, it does seem to be an unblushing wrong. Look at it closer, and it grows less so. The specifics failed because they did not meet the case. The desideratum is a pro rata tariff—*i. e.*, a uniform rate per mile for transportation. It has a very specious aspect. Yet such a law would be the grossest kind of discrimination. It would utterly ignore the first principles of commercial law and practice, and allow no distinction between wholesale and retail transactions. At one station, half a carload per day is loaded. Two miles beyond, ten or twenty carloads per day are loaded. Shall the smaller station's two miles shorter haul more than counterbalance the larger business of the other? It is simply a question of wholesale and retail. If the Legislature can prevent railroads discriminating in favor of the wholesale shipper, why not carry the principle into daily life, and compel the merchant to sell as cheaply to the laboring man, who can only buy a pound of sugar, as to the flourishing grocer, who can draw his check for a hogshead? Farmers are not the only class of suffering humanity.

Railroads are generally interested in building up their terminal points. Every road centering in Chicago works for the growth of this city. A law enforcing uniform charges per mile would put a veto on such friendly advances. Take the case of a barge-load of wheat coming down the Mississippi from Minnesota. At Dubuque or Clinton, the Illinois Central or Northwestern could afford to carry it to Chicago at a rate barely covering the cost of transportation, in order to prevent its transit down stream to St. Louis. Were the through-rate to be graduated on the uniform tariff basis, the cargo would be lost to Chicago. The same remark applies to north-and-south roads. The Illinois Central, between Chicago and Cairo, is crossed by eight railroads having western connections. Were the Central to be restricted to the uniform rate, each one of these roads would drain the competing territory of every car-load of freight, because they soon enter Indiana, beyond the reach of the law that would hamper the Illinois Central its entire length of 707 miles in Illinois.

Discrimination in favor of through business, though simple in operation arouses intense hostility. People who not understand it declare it is merciless extortion. They either forget, or do not know, that a full train, made up at a terminal station, and sent through to its destination, is worked at considerably less cost than local business, picked up piece-meal at way stations. This difference is a large item, and ought to be taken into account by the managers in adjusting their tariffs. A train starting from the Mississippi, partly loaded, stopping to leave and take on cars at intermediate stations, may earn less net, at regular local rates, than a train sent through laden with freight, carried at a lower rate.

In order to secure a share of the business at competing points, the rates on through business must be alike on all the lines, irrespective of their varying lengths. No two routes being the same in distance, it follows that the prices charged *must be* at a different rate per mile—less per mile on the longer and more on the shorter. The abolition of this practice would deprive the longer route of any share whatever in the competing business. From any interior city having direct connection with Milwaukee, Toledo, Cincinnati or St. Louis, under the operation of a *pro rata* law in Illinois, Chicago would be utterly excluded. Yet, by acquiescing in the ill-advised movement, she inaugurates a suicidal policy that would cut her off from the trade of every city having competing roads to other large centres.

Another result, equally startling, has not been taken into account: The threatened legislation would strike a death blow at the suburban towns. A uniform-rate-per-mile law will abolish all commutation tickets. It will not allow the man who travels twice a day upon the road any advantage over the man who takes a ride only once a year. The Solons who court popularity by their strenuous efforts to "regulate" the roads have not foreseen the consternation this result would create. Call in the commutation tickets, charge regular fare, and the thousands of suburban residents will set up a howl that will be a natural echo to the farmers' outcry against "monopolies." Then the corporations can consistently say that their warning was all unheeded during the popular clamor, and can let the people bear the infliction their own folly has wrought. Every settled minister in the State now has a half-fare ticket; every "drummer" travels on a 1,000-mile ticket, and each one of the residents of our numerous suburbs rides to and from the city on commutation tickets, which a uniform-rate law will oblige the companies to call in. Residents of the several towns along the Northwestern, doing business in the city, would then be privileged to pay 4 cents per mile—the rate the Board of Commissioners have established for that road, in pursuance of law—while patrons of the Hyde Park train would ride for 3 cents, and thus admirably illustrate the working of a law for the "regulation" of railways, drafted by farmers and lawyers.

The immediate result of this agitation has been to deter capital from Illinois. It is utterly impossible now to secure one dollar of money in New York for a new railroad in this State. Capital is notoriously conservative, and shrinks from contact with revolutions. When approached, capitalists say there are plenty of inviting fields for their surplus money in other States, and they decline to place it where violent agitation renders its investment precarious. If we have already as many railroads as our present development requires, no immediate injury to our prosperity may result. If not, we must do without; for astonishingly few, if any, of the declaimers against "monopolies" ever put a dollar into any railroad in Illinois. Our far-reaching system is the product of Eastern capital, from which none have reaped greater benefits than the farmers. *They* are not independent. What would be their plight were it not for the industrious artisans who throng our cities, run our manufactories, and create the demand for the farmers' products? We are a dependent, democratic people. No class can exalt itself as *the* life of the country. We live upon each other; and, were this principle more generally recognized, there would be fewer demagogues and less complainings.

It may be said that Chicago should not flourish at the expense of the State. Does not the State gain by her aggrandizement? She contributes one-sixth of the taxes paid into the State Treasury. If Chicago becomes paralyzed, the State will suffer correspondingly. Deprive her of the advantages she commands, enforce tariffs that will bankrupt her merchants within a year and drive all capital into adjacent States, and the men who are egging on the farmers will be the first to cry "Enough."

The admitted evil is in giving special rates. The companies publish a tariff that is ignored. Heavy shippers get the advantage of special rates. The principle is unjust. A large shipper can go to a small shipper, and give the latter the benefit of his special rate for a "consideration," and still enable the small shipper to save money.

Several of the railroads running westward from Chicago are now arranging their freight tariffs to conform them to the special rates, thus removing a fruitful source of complaint. It was their intention, had the Supreme Court fully sustained them in their chartered rights, to have met in convention and agreed upon the discontinuance of the profitless rates at competing points, which render discrimination at local stations so obnoxious. The aggrieved, however, impatiently demand a Procrustean law; and, when promulgated, though it will decrease the railroad earnings materially, the corporations propose to obey it literally, believing that they can stand it longer than the "people," and that those who clamored most for it will cry first and loudest for its repeal. A. D. C.

The "Farmers' Clubs" and the Railroads.

Among the numerous figures of speech for which the recent Presidential campaign was noticeable, that of the "prairie fire" was not the least common. This conflagration was continually promised and continually looked for, but it would not come. The prairies, in fact, until after the election was over, were in a decidedly uninflammable condition. No sooner, however, was the great result decided, than, at a moment when such a phenomenon was least anticipated, they suddenly flashed up into a blaze which seems likely to make the State of Illinois, at least, uncomfortably warm in a political sense for some time to come. They had been ignited by a spark from a locomotive.

Seriously, the recent convention of the Farmers' Clubs at Springfield is perhaps the most noticeable political gathering which we are likely to see for some time to come. Very few people in the East have paid much attention to it, or to the circumstances which led up to it, and yet they possess a deep political and financial significance. They constitute, in fact, an earnest, though almost inarticulate, protest against the whole present organization of the railroad system of the country—a protest the more dangerous because both unintelligent and angry. The history of the Illinois movement is somewhat as follows: Under our system of railroad ownership, an excessive competition exists for the business of all competing points, while the local business of the various competing lines is an absolute monopoly. This has naturally resulted in compelling the corporations to do through business at rates often ruinously unremunerative, which again has compelled these companies to recoup themselves for their losses and secure their profits by excessive charges on the local traffic, of which they hold undisturbed possession. A case of merchandise, for instance, would be carried on through-rates a thousand miles, from New York to Chicago, for $5; but the Illinois road which took it a hundred miles out of Chicago to its point of destination, would make a further charge on it of perhaps $5.50; and and this, too, though that same road would probably have completed the carriage from New York to St. Louis, another competing point, for a mere trifle more than the rate to Chicago. The local business, in fact, had to pay all.

As long as the times were good and prices high, as long as the farmers found ready markets and cash sales, this evident abuse, though noticed, excited little clamor. During the last few years, however, enormous areas of new country have been brought under cultivation, harvests have proved abundant and prices have fallen, until now at last freights to market consume the entire margin of profit. It has ceased to be profitable to raise food. As this unpleasant fact has gradually forced itself upon the notice of the farmers, they have more and more turned their attention upon the question of railroad charges, and two years ago the present agitation began to take shape. Of course, the first resort was to legislation. A law would easily regulate the whole difficulty. Was it not notorious that a usury law always established the rates of interest? Why, then, should not a similar one settle the question of freights? Unfortunately, in granting charters to their railroads, the Legislatures of the Western States had never reserved the power either to amend or repeal those charters, or to regulate the fares and freights which the corporations might charge under them. These charters, therefore, under the famous decision in the Dartmouth College case, amounted to contracts between the States and the corporations, and, as such, came within the scope of the constitutional inhibition of laws impairing the obligation of contracts. In no way daunted by this obstacle, the first Legislature which met under the new constitution of Illinois proceeded to enact a most intricate law, establishing maximum rates of fares and freights for all the railroads in the State, and at the same time erected a board of railroad commissioners to look after its enforcement. Then came the first trouble. The corporations of course contested the validity of the law. If the Legislature could establish one rate at which they should do the work of transportation, it could establish another. They were fighting for their lives and property; it was again taxation without representation. With much trouble and popular perturbation, a case was brought before the Supreme Court of the State, which at last held the existing law establishing fixed maxima to be constitutionally invalid, but at the same time intimated that the corporations, as common carriers, were bound to transport at "reasonable" rates, if only in each particular case what was reasonable could be ascertained. Then the Legislature, impelled by the Farmer's Club, took the question up again upon this basis, and proceeded to fix by a rule a test of the "reasonable." New statutes were prepared, establishing rates which were to be held to be reasonable, unless otherwise decided by a jury of twelve men. The power of the State was invoked to prosecute all cases of violation of the law, and a new board of commissioners was selected, which was supposed not to be more enlightened than the old ones in the discussion of railroad questions, but more, as it is termed, "in sympathy with the people." Here the case now rests. The wheel has fairly gone round its entire circumference, and the people of Illinois have got back in the nineteenth century to the position of England in the sixteenth. An arbitrary power is claimed in the supreme legislative body to decide on the reasonable rates of the cost of private services. Just as three hundred years ago the price of bread and of labor was regulated by act of Parliament, so now the cost of transportation is to be fixed by a jury of twelve men. Almost necessarily, the verdict of the twelve men can be known in advance. They may be counted upon to declare any rate reasonable which the Legislature fixes, and the corporations may make up their minds to a succession of highly unsatisfactory verdicts. We say that these verdicts may be counted upon in advance. At first glance, it may seem as though this inference was unjust, and yet, let any man who thinks at all conceive for himself, if he can, the result of a system of legislation which made the price of boots or cotton cloth or bread depend upon the verdict of a jury of twelve men sitting at the doors of each bakery or factory. It requires no great knowledge of human nature to anticipate in such a case the speedy cooling of ovens and cessation of wheels.

Thus far, therefore, the result of the Illinois railroad war must be regarded as rather portentous than satisfactory. Legislatures are once more to try their hands at the great work of fixing prices, and juries are to decide whether the prices thus fixed are what they ought to be. Such attempts are by no means new; hitherto they have not proved beneficial. The farmers of Illinois, however, may revolutionize the ripe experience of all times and of all countries, but if they do it will be through the use of a singularly mediæval machinery. While we in New York are struggling to bring about the repeal of our ridiculous usury laws, in Illinois they have not only just re-enacted them, but they are exerting themselves to extend their operations over railroads, elevators and cattle-yards—over, in a word, the whole machinery of their business. While we are discussing the shortcomings of the jury system, they are elevating that somewhat obsolete tribunal into a species of grand, general financial regulator. The panel is, in future, to pass upon disputed points of political economy—a method of arriving at correct results which never probably suggested itself to the late Dr. Adam Smith. Still, unique as the machinery is, it will not improbably grind out the result immediately desired by its ingenious inventors. But what then?—will their condition be thereby improved? This we gravely doubt.

What, after all, is the occasion of this plethora of the produce of the West, which has gone on reducing prices until profits are now wholly eaten up in freights? Manifestly it is due to the fact that railroad development has extended the area of attainable food-producing lands over so wide a region that more food is produced than can be disposed of to a profit under the present cost of production. Let us suppose that the hope of the farmers was realized, and that their great staples could be brought to the market at half of the present cost, what would be the result to them? Would they profit by the reduction? It is difficult to see how they could. The immediate result would be a vast extension of even the present area of profitable food production, and the introduction of a new host of competitors. Every reduction of rates would thus enure wholly to the consumer—not at all to the producer. Return freights might be lower, which would somewhat, though to a very small degree, reduce the price of manufactured articles in the West, but the farmer would have no more money in proportion to buy them with. The difficulty is in over-production at the present cost of production, not in high rates of carriage. To increase his profit, the farmer must reduce the cost of growing his crops, and at the same time limit the area which competes with him, otherwise every dollar yielded to him or extorted by him in rates will accrue not to his benefit but to the benefit of the consumer, and of other farmers further West now excluded from the market.

So far as the present phase of this question is concerned, therefore, the remedy would seem to be beyond the reach of the railroad corporations. Every possible concession which the most enthusiastic farmer demands on their part would but remove the seat of the struggle. But it still brings forward into clear, strong light what must inevitably prove one of the momentous questions of the future. In its essence, that which the farmers demand is just. They ask for an access to their markets which shall combine the three elements of certainty, economy and impartiality. All these are reasonable demands, and yet these are just what the existing system of transportation can never afford. It is not the fault of the railroad corporations. It is nothing less than the breakdown of competition as applied to our railroad system. The cost of transportation cannot be certain where it is necessarily subject to periodical wars of rates, resulting in brief truces of extortions; it cannot be economical while performed by many agents dividing the traffic, which can only flow cheaply when concentrated in single broad, deep channels; it cannot be impartial while the results of ruinous competition at one point must necessarily be made good by double profits at another. In other words, we are gradually realizing that this enormous interest has been built up on a false economical principle—that competition will regulate where it has full, free play, but where it has not such full, clear play, it must confound.

A vague glimmering of this difficulty is beginning to dawn on our people. The remedy for it lies far beyond the verdict of any twelve men in a jury-box; however intelligent these may be, they can hardly supplement defective laws of trade. The contest now going on in Illinois is one of the early skirmishes of the impending war, which, unless we greatly err, is destined to produce industrial, social, and, above all, political changes in this country of the most startling description. The locomotive is coming in contact with the framework of our institutions. In this country of simple government, the most powerful centralizing force which civilization has yet produced has, within the next score of years, yet to assume its relations to that political machinery which is to control and regulate it. —*The Nation.*

General Railroad News.

ELECTIONS AND APPOINTMENTS.

—A circular from the office of the General Superintendent of the International & Great Northern Railroad announces the following changes and appointments:

Mr. S. Schoch, Superintendent of the Houston Division, having resigned, Mr. James R. Faulkner will assume the duties of Assistant Superintendent, with office at Palestine.

John Adams, Master Mechanic, having resigned, Mr. T. J. Shellhorn will assume charge as Master Mechanic of the Brazos Division, in addition to his present duties.

Mr. A. C. Atherton is appointed Train Dispatcher, with office at Houston.

Mr. Atherton has been for several years Train Dispatcher on the Iowa Division of the Chicago, Rock Island & Pacific road.

—Mr. J. B. Hill has been appointed Agent of the Union Line at Milwaukee, Wis., in place of Samuel Laughlin, resigned.

—Major Charles B. Peck has been appointed Acting Superintendent of the Leavenworth, Lawrence & Galveston Railroad.

—The present board of directors of the Lake Ontario Shore Railroad Company, chosen at the annual meeting held April 1, is as follows: Luther Wright, J. G. Kellogg, Charles Effuer, A. S. Page, O. P. Scovell, Burt Van Horn, D. G. Fort, Wm. O. Woort, H. N. Curtis, Martin Morris, R. F. Wilson, A. F. Smith, L. R. Boynton.

—Mr. W. F. Slater, late Superintendent of the Monticello Railroad, has been appointed Paymaster of the Indianapolis, Bloomington & Western Railroad.

—At the annual meeting of the Baltimore, Pittsburgh & Chicago Railroad Company, Ohio Division, held at Columbus, O., April 7, the following board of directors was elected: W. C. Quincy, Wm. Keyser, John K. Cowan, George R. Dennis, Wm. C. Hoigate and Smith. The board organized by the election of W. C. Quincy, President, and William Wing, Secretary and Treasurer.

—Mr. C. K. Lord, General Passenger Agent of the Indianapolis, Cincinnati & Lafayette Railroad, having resigned to accept a position on the St. Louis, Kansas City & Northern road, Mr. A. G. Page, heretofore General Freight Agent, will hereafter fill both positions under the title of General Freight and Ticket Agent.

—At the annual meeting of the stockholders of the Chicago & Michigan Lake Shore Railroad Company, held at Muskegon, Mich., April 8, the following board of directors was elected: Charles Meriam, John W. Brooks, H. H. Hunnewell, Nathaniel Thayer, Charles F. Adams, Jr., of Boston, Mass.; James F. Joy, L. E. Mason, Detroit, Mich.; A. H. Morrison, St. Joseph, Mich.; and Freeman Godfrey, Grand Rapids, Mich. Messrs. Joy, Morrison, Mason and Godfrey are the only members of the old board re-elected.

—Mr. Charles S. Lane has been appointed Chief Road Master of the Housatonic Railroad. Mr. Lane was formerly in the employ of the Housatonic road, and has since held positions on the Connecticut Western and Shepaug Valley roads.

—At the annual meeting of the stockholders of the Cincinnati, Richmond & Fort Wayne Railroad Company in Richmond, Ind., April 3, the following board of directors was elected: Andrew F. Scott, John H. Moormann, Elwood Patterson, D. McLaren, William Parry, Asahel Stone, Arthur McKew, David Studabaker, David Crabbs, Pliny Hoagland, J. N. McCullough. There were 29,263 shares voted. The board elected the following officers for the ensuing year: Wm. Parry, President;

Asahel Stone, Vice-President; C. C. Binkley, Secretary and Treasurer. The President's and Secretary's salaries were fixed at $1,000 each for the ensuing year.

—Mr. Luther Allen has been appointed Auditor of the Toledo, Wabash & Western Railway, with office at Toledo, O.

—Mr. John Davidson has been appointed Paymaster of the Northern Pacific Railroad, with office at Brainerd, Minn. He has been agent for the company at Stillwater, Minn.

—The stockholders of the American Steamship Company, at their annual meeting in Philadelphia recently, elected the following board of directors: E. C. Knight, President; Josiah Bacon, John Rice, B. H. Bartol, John Price Wetherill, Henry D. Welsh, D. B. Cummins, Samuel T. Bodine, M. Baird, N. Parker Shortridge, Strickland Kneass. This is the Pennsylvania Railroad Company's new steamship line from Philadelphia to Liverpool.

—At the annual meeting of the stockholders of the Missouri, Iowa & Nebraska Railroad Company, at Centerville, Iowa, in January last, the following board of directors was elected: B. E. Smith, Columbus, Ohio; J. T. Thomas, Philadelphia; Andrew Carnegie, George Opdyke, C. J. Pusey, C. P. Palmer, Wm. H. Gebhard, New York; Henry Hill, Warsaw, Ill.; F. M. Drake, Wm. Bradley, C. W. Bowen, J. A. Talbot and Jacob Rummel, Centerville, Iowa. Mr. Gebhard, who replaces A. Richard, of Centerville, is the only new director. At a meeting of the directors held in New York, March 27, the following officers were elected for the ensuing year: F. M. Drake, President, re-elected; Jacob Rummel, Secretary, and James Fitz Henry, Treasurer.

—The Indianapolis *News* says that it is reported that D. E. Rice has been appointed Superintendent of Telegraph of the St. Louis, Vandalia, Terre Haute & Indianapolis road, and that George Knowlton, late conductor on the road, has been appointed Master of Transportation.

—The stockholders of the Manhattan & Northwestern Railroad Company, at the annual meeting in Manhattan, Kan., recently, elected the following board of directors: N. A. Adams, E. B. Purcell, L. R. Elliott, C. E. Olmsted, Albert Griffin, I. T. Goodnow, Col. Doane and J. S. Randolph. The board organized by the election of N. A. Adams, President; C. E. Olmsted, Vice-President; E. B. Purcell, Treasurer; and L. R. Elliott, Secretary.

—At the annual meeting of the Manhattan & Southern Railroad Company at Manhattan, Kan., recently, the old board of directors was re-elected, with the exception of N. Green, who was succeeded by Dr. N. L. Chandler. The board of directors organized by the choice of C. M. Dyche, President; T. Weichselbaum, Vice-President; L. R. Elliott, Secretary; and H. G. Barner, Treasurer.

—The directors of the Great Southern Railroad Company, which proposes to build a new road from St. Louis to Belmont, have organized by the election of Hon. Joseph Brown as temporary President and W. M. Kasson Secretary. Messrs. Brown, Valle, Garrison, Taylor and Chouteau were appointed an executive committee.

—Mr. J. B. Power has been appointed General Agent of the Land Department of the Northern Pacific Railroad in place of George B. Wright, resigned. Mr. Power has been for some time Chief Clerk under Mr. Wright.

—The officers of the New Jersey Railway Company, which has just been organized under the general law of New Jersey to build a railroad from New York to Philadelphia, are as follows: President, Edward T. Green; Secretary, William J. Sewell; Treasurer, R. D. Barclay; Chief Engineer, J. B. Culver; directors, Isaac W. Scudder, Delos E. Culver, J. B. Culver, Jersey City, N. J.; Richard F. Stockton, John G. Stevens, William G. Cook, Barker Gummere, Benjamin Fish, Richard Stevens, Charles E. Green, Trenton, N. J.; William J. Sewell, William Bettle, Jr., Camden, N. J.; Benjamin Williamson, Elizabeth, N. J.; G. M. Dorrance, I. W. Harrison, Philadelphia. Most of these gentlemen are connected with the United Companies of New Jersey.

—Major James S. Yard has been appointed Commissioner of Railroad Taxation of New Jersey, under the act for the taxation of railroad companies passed by the late Legislature of New Jersey.

—At the annual meeting of the Columbus & Hocking Valley Railroad Company, at Columbus, O., recently, the old board of directors was re-elected, as follows: Benjamin E. Smith, M. M. Greene, W. G. Deshler, W. B. Brooks, C. P. L. Butler, J. L. Gill, Theodore Comstock, Isaac Eberly, John Greenleaf, Columbus, O.; John D. Martin, Lancaster, O.; C. H. Ripley, Logan, O.; S. N. Pickering, Athens, O. The board subsequently re-elected the old officers, as follows: President, B. E. Smith; Vice-President, M. M. Greene; Secretary and Treasurer, J. J. Janney; Superintendent, J. W. Doherty.

—The new Board of Railroad and Warehouse Commissioners of Illinois, consisting of Henry D. Cook of McLean County, David A. Brown of Sangamon, and John M. Pearson of Madison, has organized by selecting Commissioner Cook as Chairman, and by re-electing J. H. Raymond as Secretary. The Board will hold regular meetings at its office in Springfield on the first Tuesday of each month. Adjourned meetings will be held from time to time in Chicago. All communications intended for the Board should be addressed to the Secretary, at Springfield.

PERSONAL.

—The Portland (Me.) *Press* says that Judge Richard D. Rice will not accept the position of Resident Vice-President of the Northern Pacific Railroad Company on the Pacific coast, to which he was recently elected.

—The St. Paul (Minn.) *Press* says that Mr. C. T. Hobart, late Superintendent of the Minnesota Division of the Northern Pacific Railroad, has taken a contract on the Canada Pacific road.

—On the 12th inst., the employees of the Passenger Department of the Illinois Central Railroad presented to Mr. William A. Thrall, late the Assistant General Passenger Agent and now General Ticket Agent of the Chicago and Northwestern, a beautiful silver service valued at $800. Mr. Thrall was with the Illinois Central a great many years, and earned by long service with them the good will of those associated with him, which they have thus manifested so handsomely.

TRAFFIC AND EARNINGS.

—The earnings of the Grand Trunk Railway of Canada for the week ending March 22 were: 1873, £36,500; 1872, £27,700; increase, £8,800, or 31¾ per cent.

—The earnings of the Erie Railway for the week ending April 7 were: 1873, $329,532; 1872, $295,399; increase, $34,133, or 11½ per cent.

—The earnings and expenses of the Columbus & Hocking Valley Railroad for the year 1872 were as follows:

Gross earnings ($9,606 per mile)	$854,892 45
Expenses (48¼ per cent.)	412,229 67
Net earnings	$442,662 78

As compared with the previous year there is an increase in gross earnings of $305,950.04, or 55¼ per cent.; an increase in expenses of $149,020.26, or 56½ per cent.; and an increase in net earnings of $156,929.78, or 54½ per cent. The road extends from Columbus, O., southeast to Athens, 76 miles, with a branch from Logan to New Straitsville, 13 miles, making 89 miles in all. Its principal traffic is in coal.

—The earnings of the Kansas Pacific Railway for the fourth week in March were: Passengers, $31,457.70; freight, $60,498.76; mails, $2,055.32; total, $94,011.78. Of this amount, $3,499.52 was for transportation of troops, mails and government freight.

—The earnings of the Great Western Railway of Canada for the week ending March 23 were: 1873, £24,548; 1872, £21,671; increase, £2,877, or 13¼ per cent.

—The earnings of the Grand Trunk Railway of Canada for the week ending March 29 were: 1873, £32,700; 1872, £33,100; decrease, £400, or 1¼ per cent.

—The following statement of the receipts and expenses of the Central Railroad of New Jersey for the three months ending March 31 is published:

	1873.	1872.	Increase.	Per ct.
Receipts	$1,802,870 41	$1,483,442 87	$319,427 54	21½
Expenses	1,070,988 79	981,254 65	89,734 14	9⅛
Net earnings	$731,881 62	$502,188 22	$229,693 40	45¾

The expenses for 1873 were 59⅜ per cent. of receipts, and for 1872 66½ per cent. For 1873 the earnings per mile were $6,628, and for 1872, $5,454.

—The following additional earnings for March have been reported:

	1873.	1872.	Increase.	Dec.	Per ct.
Atlantic & G. Western	$420,250	$372,397	$47,853	....	12⅞
Atlantic & Pacific	122,348	98,881	23,467	....	23¼
Bur., Ced. Rap. & Minn.	85,561	69,346	16,215	....	23⅜
Chicago & Alton	434,614	378,021	46,593	....	12⅜
Illinois Central	651,961	572,175	79,786	....	13⅞
Kansas Pacific	300,719	292,671	8,048	....	2¾
Lake Sh. & Mich. So'n	1,735,736	1,470,048	265 688	....	18⅛
Missouri, Kan. & Texas	252,400	95 683	156 717	....	163¾
Pacific, of Missouri	344,633	327,401	17,223	....	5¼
St. Louis, Alton & T. H., main line	122,299	124 9 0	...	2,611	2⅛
St. L., A. & Terre Haute, branches	55.217	41,167	14,050	....	34¼
St. L., Kan. C. & Nort'n.	229,735	256,013	...	25,288	10¼
Toledo, Wab. & West'n.	471,301	460,646	10,655	....	2⅜

THE SCRAP HEAP.

Civil Engineers' Club of the Northwest.

The April meeting of this club was held on the evening of the 14th, at the office of Mr. Ellis S. Chesbrough, the City Engineer. The paper for the evening was on "Regulating Freight Tariff by Law," by Mr. Robert Harris, General Superintendent of the Chicago, Burlington & Quincy Railroad.

Duplex Telegraphing.

We learn from the *Engineer* that Mr. Eden, in-door engineer in the Edinburgh telegraph office, has invented a system by which, with the existing instruments, it has been found practible to send messages from both ends of a single wire simultaneously. The invention has been tested between Edinburgh and Glasgow, and it has been found that one wire is capable of doing double work.

Steam Dredger.

The *English Mechanic* gives the following account of the steam dredger "Canada," recently constructed for the Dominion Government:

"The Canada sailed from the Clyde in May last, and steamed across the Atlantic to Halifax in seventeen days. After dredging at that port for some time she proceded to Richibucto and other ports, where she cut through various obstructions, and then steamed to Pictou, Nova Scotia, at which place, from accounts just received, she has done her work very satisfactorily, and is a great wonder to the Canadians; she loads her own hopper in an hour and a half with 200 tons of her own spoil, and then conveys it to a distance of five miles, and there deposits it in the deep sea. Her speed under steam so loaded is five to six miles per hour, the consumption of fuel being two tons per twelve working hours. When unretarded, five cargoes, or 1,000 tons, are lifted and deposited in two days' dredging, and this extraordinary type of dredger has lifted, removed and deposited 20,000 tons in about forty working days. When it is considered that the above work is done with one vessel and one crew, this new mode of dredging promises to result in a great saving of expense over the current system of stationary dredgers, barges, punts and tug-steamers, each with its respective crew, cost, consumption, interest, wear and tear and insurance. The 'Canada' was designed and constructed by Messrs. W. Simons & Co., engineers and shipbuilders, Renfrew, who are also just completing there a new dredger for the Khedive of Egypt, under the direction of Mr. Fowler, C. E. She is a patent combined screw-hopper dredger, taking up her own cargo and steaming away with it. She is also, as will be understood from the above, capable of making a voyage over the Atlantic or anywhere else."

Color Blindness.

We have frequently called attention to the danger arising from color blindness in railroad employees. That this abnormal condition is more common than is usually supposed, only a little inquiry among one's friends is required to show. The following description of a machine for detecting this weakness we cut from a contemporary:

"An instrument has been invented in Germany for testing color blindness. It consists of a rotating apparatus, which moves a disk whose center is a circle, one-half black and the other white; outside of this is a ring half red and half green, then another ring of violet and and red, then the outside ring of violet and green. When rapidly rotated, the center appears to be colored gray, that is black and white mixed. To a green-blind person the middle line will appear gray, that being the result to him of a mixture of violet and red. The outer ring will appear gray to the red-blind patient, and the inner, gray to the violet-blind. By the use of this instrument a large number of patients may be simultaneously examined for one or more kinds of color blindness."

Utilizing Slag.

Blast-furnace slags are granulated at Osnabrüch, Germany, by allowing the molten stream from the tap to flow into water from a suitable height, in the same way as lead is converted into shot in towers. The slag is used for filling in between railroad sleepers, and also in the manufacture of concrete; and, if it contains considerable alumina, is ground and converted into alum.

Cost of European Railroads.

It is estimated by M. H. Busson that there are nearly 18,100 miles (English) of railroads in Europe, which have cost a gross total of 424 millions sterling, apportioned as follows: The United Kingdom, 7,670 miles, costing about 264½ millions; France, 2,519 miles, 64 millions; Prussia, 2,370 miles, 26½ millions; Germany (various States), 2 175 miles, 21 millions; Austria, 1,490 miles, 15 millions; Russia, 712 miles, 11½ millions; Belgium, 550 miles, 10 millions; Italy, Sardinia and other States, 610 miles, 11½ millions.

Cost of French Railroads.

From computations recently made by M. Henri Busson, it appears that the average outlay on a double line of railroad is 329,712 francs per kilometre, or about $62,500 (gold) per English mile; of which the preliminary and general expenses are estimated to form 5 per cent.; the acquisition of lands, 9·3; earthwork and constructive work, 27·1; permanent way and accessories, 36·6; stations and dependencies, 4·2; sundries, 3·2; and rolling stock, 14·6 per cent. of the total cost.

Railroad Manufactures.

The Rhode Island Locomotive Works at Providence, R. I., are now turning out 12 engines a month, and have orders on hand for 112. The works employ over 900 men.

The Messrs. Jenkins, of Windsor, Ont., have contracted to build a large steam car ferryboat for the Detroit River crossing. The boat is to carry sixteen coaches at one trip.

Irony.

The New York *Tribune* says:

"What were the windows in public halls made for? For what use were the ventilators in railway cars intended? Certainly not to give air to the wretched beings who gasp within those ornamental precincts. Steinway Hall, for instance—which has sufficient means of ventilation—is, when filled by a large audience, a kind of mild Black-Hole. The confined air is bad enough, but still worse is the aggravating knowledge that it is entirely unnecessary, and is only caused by ignorance and carelessness. On some of the railway lines about New York the ventilators are scarcely ever found open, and a violent headache is the almost inevitable consequence of an hour's ride. On the New Haven and Harlem roads it is said that travel is quite without exception rendered delightful by hot stoves and closed ventilators, and no appeals to conductors are sufficient to open those windows, which are small enough at best. No one expects that lecture-room ushers and train officials will understand hygiene; but why shouldn't the people who know better and have the power make rules for ventilation which the men they employ can comprehend and be forced to execute? This is not by any means a small matterto those who travel or go to lectures and concerts in cold weather."

Accident in the Mount Cenis Tunnel.

A serious accident recently occurred in this tunnel, of which the Swiss papers give the following account:

"A goods train from Modane came to a standstill in the middle of the tunnel, as the people all had fainted from the absence of atmospheric air, which was increased by the suffocating smoke and steam emitted by the engine. About the same time another train from Bardonneche entered the tunnel from the opposite end, and finding the first train without motion, took it in tow and carried it back to Bardonneche, where the people recovered from their state of insensibility. But this accident was unfortunately accompanied by the loss of one life and injury to another passenger; for two of the people belonging to the first train had proceeded on, probably to warn the train from Bardonneche that theirs had come to a standstill in the tunnel. It is not yet ascertained whether they were also overpowered by the foul air and fell down insensible, or whether they could not get out of the way in time, but it is a certain fact that the train passed over them, killing one of them on the spot and injuring the other so severely that he is as yet not in a condition to give an account of the circumstances attending the accident."

The Heberlein Brake.

Captain Fairholme, writing from St. Petersburg, says that in addition to its adoption by one railroad for all its traffic, and its promised adoption by others, the owners of this brake have been specially requested, unsolicited, to apply the Heberlein brake system to the train then fitting to convey the Empress of Russia through Germany over the Bremner to Italy, in addition to having also to apply it to two other Imperial trains.

A Wire Rope Railroad.

Iron says that the wire rope railroad at Metz, running from that town to the fortress of Quenlen, was finished last November. Difficulties have, however, been constantly met with. One of them was the ready detachment of trucks, of 5 cwt. burden, which, at the same time, had to run securely up and down hill. The line has a double gauge of wire rope of from 0.025 to 0.03 metres diameter. It is 2,000 metres long, and supported at every 25 metres. It crosses two turnpike roads, three roads, one river, a hill, three valleys, and reaches the fortress at a rise of 45 metres. A stationary engine, of 12-horse power, propels 20 trucks on each side, 40 together. At each terminus there is a short line of 300 metres, for receiving the trucks, and leading them close to the stations of loading and discharge.

Prizes for Designs.

The Coachmakers' and Coach Harness Makers' Company, of London, which is not a joint-stock manufacturing corporation, as might be supposed, but an organization of the firms or persons engaged in the business, something like the Bar Association, etc., has offered a first prize of a silver medal and three pounds, and a second of a silver medal and two pounds, for the best free-hand or mechanical drawings applied to carriages or parts of carriages, or their ornamentation, and the "Master" of the comaany also offers similar prizes.

Comfortable Stock Cars.

The Royal Society for the Prevention of Cruelty to Animals, of England, offers two prizes, of £100 each, for the best model of cattle car, so made that food and water can be supplied during a journey, and a model of the ordinary English stock car, or "cattle wagon," so altered that the animals may eat and drink without being removed. If a railroad company should bring into use 50 such wagons, the prizes will be doubled.

OLD AND NEW ROADS.

Milwaukee & St. Paul.

This company is making preparations to transfer freight by barge between La Crescent, Minn., and the depot landing in La Crosse.

Wasatch & Jordan Valley.

Track laying has commenced on this Utah narrow-gauge line, and the iron is down for about three-quarters of a mile.

Virginia & Truckee.

The Carson (Nevada) *Register* says: "We very much doubt if there is a railway of like length in the United States that does an equal amount of business to that which is transacted over the 21 miles of line between here and Virginia City. On the 28th ultimo 307 cars, the same constituting 34 distinct trains, passed over the road between the Carson depot and the Virginia City terminus. Of these cars 89 of the up-trains and 97 of the down-trains were loaded; wood, timber and merchandise going up and ore coming down."

Central, of Iowa.

The negotiations for the lease of this road to the St. Louis, Kansas City & Northern are said to have fallen through.

Washington City, Virginia Midland & Great Southern.

At a meeting of the stockholders of the Orange, Alexandria & Manassas and the Lynchburg & Danville companies, held at Lynchburg, Va., April 8, the consolidation of the two companies was finally completed, and the above adopted as the name of the new company. The lines owned by the new company consist of a line from Alexandria, Va., southwest to Lynchburg and thence south to Danville, in all 246 miles long, with a branch from Warrenton Junction to Warrenton, 9

miles, and a line from Manassas Junction west to Strasburg and thence south to Harrisonburg, 112 miles, with a branch one mile long to Front Royal. The whole length of line is 368 miles. Of this the 75 miles from Lynchburg to Danville is not yet completed, but, it is expected, will be opened this season. The 22 miles from Charlottesville to Gordonsville is leased from the Chesapeake & Ohio Company and used in common with that company, making the length of the road owned 346 miles.

Wisconsin Central.

The Attorney-General of the United States has given his opinion that this company is entitled to a grant of land for that part of the road constructed north of Stevens' Point, and that the company was not compelled to commence building its road at Portage City to entitle them to land for the road constructed north of Stevens' Point.

This road was chartered by the State of Wisconsin to commence at Portage City and run north, and to receive ten sections of public land per mile on each side of the road, Congress having voted to the State a certain amount of land for railroad purposes.

The company, instead of commencing its road at Portage City, began work at Stevens Point, some distance north of the first named place, and the question was raised that the company, not having started at Portage City, was not entitled to the land.

Caldwell & Millburn.

Under its amended charter this company proposes to build a railroad from New Brunswick, N. J., north to the State line near Sufferns, N. Y., on the Erie Railway, a distance of about 50 miles. At Sufferns connection could be made with some of the projected lines which are to cross the Hudson and run to various points in New England.

Macon & Cincinnati.

This company propose building a line from Macon, Ga., nearly due north to Knoxville, Tenn., about 240 miles. The line been surveyed from Macon north to the Chattahoochee River, about 100 miles. Arrangements have been made to purchase the Knoxville & Charleston road, which is already built from Knoxville south about 16 miles to Maryville.

Canada Southern.

London papers of the 5th contain this company's invitation for subscriptions for $2,500,000 of its sterling 7 per cent. first-mortgage bonds, which were to be issued at 93½. The amount issued in this country is reported to be $6,260,000, so that the total issue (there being 292 miles of road) will be at the rate of $30,000 per mile. The mortgage is for $240,000 more, which amount is "reserved for further extensions."

Texas & Pacific.

The Supreme Court of the United States, on the 15th, rendered a decision affirming the right of the Memphis, El Paso & Pacific Railroad Company, whose rights and property the Texas & Pacific has acquired, to a grant of 8,000,000 acres of land made by the State of Texas before the war, the validity of which the State has contested.

Meetings.

The Louisiana & Missouri River Railroad Company will hold its annual meeting and election at Louisiana, Mo., May 5.

The Indiana & Illinois Central Railway Company will hold its annual election in Indianapolis, May 7.

The Delaware & Hudson Canal Company meets to elect managers, May 13, at No. 71 Broadway, New York. The polls will be open from noon till 2 p. m.

The Long Island Railroad Company holds its annual meeting for the election of thirteen directors at Hunters' Point, L. I., May 22.

Missouri, Kansas & Texas.

A telegram from Parsons, Kan., says that a contract has been made for the transportation by this road of 9,000 sheep from Denison, Texas, for the New York market—a new feature in Texas traffic; also that through trains between Chicago and Denison, and St. Louis and Denison will be put on by the 1st of May.

Michigan Central.

The trustees of the sinking fund will receive proposals at No. 30 Sears Building, Boston, down to noon of the 12th, for the sale to them of the company's first sinking-fund bonds to the value of $8,500, and of other first or second sinking-fund bonds to the value of $3,000.

Grand Rapids & Indiana.

The Trustees (G. W. Cass and J. Edgar Thomson) invite offers until 3 p. m. on the 12th for the sale to them of $40,000 of the gold bonds, for the sinking fund.

Central Pacific.

California papers report that the company is about to commence work again on the line from Banta's, 17 miles west of Stockton, by way of Antioch to Oakland. Some work was done on this line last year. By this line, it is said, the heavy grades through the Livermore Pass on the present road will be avoided and the distance will be shortened somewhat. The line will also command considerable local traffic from Contra Costa County. It will be about 60 miles long.

St. Louis & Great Southern.

A committee, of which W. Marsh Kasson is Secretary, has been formed in St. Louis to push forward this project. The line proposed is to extend from St. Louis south, parallel with the Iron Mountain road and three or four miles west of it for some 27 miles, then crossing that road and running along the river to St. Mary's; thence in nearly a straight line through Cape Girardeau to Belmont, with a branch to a point opposite Hickman, Ky., the terminus of the Nashville & Northwestern. It is claimed that the distance by this route from St. Louis to Belmont will be 160 miles against 195 by the Iron Mountain, and to Hickman 170 miles. It is also claimed that the line passes through a fertile country, much of it without railroad facilities.

The committee have communicated with Mr. Cole, President of the Nashville and Chattanooga Company (which leases the Nashville & Northwestern road), but that gentleman answered, recommending an increase of the rolling stock of the Iron Mountain road and the construction of a branch of that road to Hickman rather than the construction of any new line.

Virginia & Reno.

It is proposed to build a new road from Virginia, Nev., to the Central Pacific at Reno, which will avoid the heavy grades and sharp curves of the present road (the Virginia & Truckee). The present road does a large business in the transportation of ore, lumber and fuel to the mills on Carson River, which, with the local business between Carson and Virginia, would still be left to it, if the new line is built.

Green Bay & Lake Pepin.

Efforts are being made to raise $50,000 by private subscription in Winona, Minn., in order to secure the building of the road to that point.

Kansas City & Northern.

The route of this proposed road will be from Parkville, Mo., on the Kansas City, St. Joseph & Council Bluffs road, 10 miles from Kansas City, north along the line between Platte and Clay and Buchanan and Clinton counties to Gower; thence northeast to Osborne, and thence north through Harrison County to the Iowa line. At the Iowa line connection will be made with an extension of the Leon Branch of the Burlington & Missouri River road. The length of this road would be about 120 miles.

Canada Southern.

The Niagara Falls (N. Y.) *Gazette* says: "Mr. W. A. Thomson, on behalf of the Canada Southern Railway, has gained his suit against the Great Western or the use of the old Suspension Bridge for the Southern. A number of the directors were in Clifton a few days ago, looking out for a site for a station house, and to take measures to connect their road with the bridge."

St. Clair & Chicago Air Line.

The Romeo (Mich.) *Observer* says: "The grading through to Rochester is well advanced. Mr. Emery has worked in the deep cut nearly all winter. His job extends from the county line to the village of Rochester. The work this side has been done by H. F. Bean and M. G. Bixby. The timber for the culverts and bridge is now on the ground through to Bay City road. Mr. Bixby has taken the job to put up the bridges and culverts, which he has already commenced."

This company now owns what was formerly known as the Eastern Division of the Michigan Air line, which is intended to run from Ridgeway southwest to Jackson, and is now in operation from Ridgeway to Washington, 22 miles.

New York, West Shore & Chicago.

The Chief Engineer of this company has completed his estimates of the cost of the road. These estimates include the cost of graduation, bridges and superstructure for a double-track road of 4 feet 8½ inches gauge. The amounts are as follows:

Eastern Division, Jersey City to Catskill, 110 miles	$7,655,000
Middle Division, Catskill to Syracuse, 163 miles	10,106,000
Western Division, Syracuse to Buffalo, 147 miles	8,452,500
Whole line (420 miles)	$26,213,500

This is about $62,413 per mile. The general direction of the line is north to Catskill, thence northwest to Utica, and thence nearly due west to Buffalo.

Potomac & Manassas Junction.

This company is authorized to construct a railroad from Quantico, Va., on the Richmond, Fredericksburg & Potomac, northwest to the Potomac between Point of Rocks and Edwards' Ferry. The line as located crosses the Orange, Alexandria & Manassas near Bristow and thence runs through Leesburg to the Potomac near the mouth of the Monocacy. At this point connection will be made with the proposed extension of the Frederick & Pennsylvania Line Railroad from Frederick, Md., south.

Missouri, Kansas & Texas.

The track on the extension from Sedalia, Mo., to Moberly was laid on the 10th for a distance of 31½ miles northeast from Sedalia, leaving only 21½ miles to be laid to complete the line.

Hoosac Tunnel.

During the month of March the heading was advanced from the west end eastward 162 feet, and from the east end westward 155, a total extension of 317 feet. The total length opened to April 1 was 22,793 feet, and remaining to be opened, 2,238 feet.

Baltimore, Pittsburgh & Chicago.

A dispatch from Defiance, O., says that it has been finally decided to locate this road on what is known as the "South Line." Contractors are to commence work at once and to push it forward.

Fall River, Warren & Providence.

The stockholders of this company met at Warren, R. I., April 8, and voted to accept the act recently passed by the Legislature authorizing the issue of $300,000 of bonds to pay the present bonded debt and other liabilities of the company.

Denver & Rio Grande.

It is reported that this company will build this season a branch of its road from Colorado Springs to Fairplay.

New Haven, Middletown & Willimantic.

Only four miles of track remain to be laid to complete this road.

Boston, Hartford & Erie.

Judge Phelps, in the Supreme Court at Hartford, Conn., has decided against the petition of the Erie Railway Company to be admitted as a party defendant in the suit of George Ellis against the Boston, Hartford & Erie Railroad Company.

Cleveland, Columbus, Cincinnati & Indianapolis.

A number of the stockholders of this company have determined to resist the proposed lease of the road to the Atlantic & Great Western Company and the proposed issue of $5,000,000 of new stock. It is claimed that the issue of new stock is entirely unnecessary, and that it is proposed only in order to secure the proceeds of the stock for the uses of the Atlantic and Great Western. The lessees propose to pay the interest on the bonds and 7 per cent on the stock, but it is claimed that the security offered is doubtful. The principal opponents of the lease are Messrs. Otis, Crocker, Cadwell and others, of Cleveland, and Leland Brothers & Co., of New York, who represent a number of the Eastern stockholders. It is probable that legal measures will be taken to prevent a consummation of the lease.

A dispatch from Cleveland, O., dated April 15, says that the hearing in the application of stockholders of the company for an injunction restraining the proposed lease of the road and its dependencies to the Atlantic & Great Western Railway, was finished before Judge Emmons, in the United States Circuit Court, that morning. Affidavits were presented by defendants in reply to allegations of plaintiffs, after which Judge Emmons gave his decision granting the injunction as to the leasing of the road, but denying it as to an increase of capital. An injunction against both was granted in the Cuyahoga Common Pleas Court on Monday.

Railroad Restrictions in the New Pennsylvania Constitution.

In the Convention now engaged in preparing a new constitution for Pennsylvania, the Committee on Railroads and Canals reported on the 11th instant an article in eighteen sections, of which the following is a synopsis:

"The stock-books of railroads are to be kept open for public inspection. No railroad company shall consolidate with a parallel or competing line, or lease, operate or in any way control such line, under penalty of a forfeiture of their charter. No railroad company shall engage in mining or manufacturing for others, or shall acquire lands, except for their necessary uses as transporters. The persons and goods of the people of the State must be carried on as favorable terms as the persons and goods of the people of other States. All freight and passenger tariffs must be uniform, and no higher proportionate charges shall be made for short distances than for long distances. No road shall discriminate against a connecting road. Officers and stockholders of railroad companies are prohibited from being interested in transportation companies engaged in transporting goods over their lines. No preference shall be shown to any individuals or companies shipping freight. Any combination between railroad companies or between any railroad and coal company, relative to increasing rates of transportation or raising the price of coal, shall work a forfeiture of their charters. The watering of stock is forbidden by a stringent section. The issue of free passes by a road, except to its employees or to indigent persons who are objects of charity, is forbidden. The Legislature is restrained from limiting the amount that may be recovered for loss of life or personal injury sustained by passengers. A passenger may step off before reaching his destination, and go on by another train, and is not to be charged extra for so doing or annoyed in any way."

The correspondent of the New York *Tribune* says that the adoption of this article by the Convention "is almost certain," and that it will be supplemented "by a provision amounting in effect to a free railroad law."

Atlantic & Great Western.

At a meeting of the stockholders, held in New York, April 11, the agreement for the lease of the Cleveland, Columbus, Cincinnati & Indianapolis road was ratified. It is reported that if this lease is consummated the issuing of several million dollars of new Atlantic & Great Western bonds, to meet the liabilities and expenses incurred, will probably come up for consideration at a meeting of the board of directors.

Shenandoah Valley.

The contracts for the construction of nearly all the sections on the Second Division, from Riverton to Luray, Va., have been let, and work is to be commenced at once. Work on the masonry for the bridge over the Shenandoah at Riverton will be commenced as soon as the water in the river is low enough. It is expected that the remaining 60 miles from Luray to Fisherville on the Chesapeake & Ohio will be let about June 1.

A meeting of the stockholders has been called, to be held at Front Royal, Va., May 21.

Portland & Odgensburg.

The trains of this road now run to and from the Boston & Maine depot in Portland, Me. Trains are to be put on next summer to run from Boston over the Boston & Maine and Portland and Ogdensburg roads through to Conway and Lawrence, N. H. The latter place is only six miles from the Crawford House in the White Mountains.

Grand Trunk.

This company advertises for proposals for 600 cattle, or box freight cars, 200 platform cars, 2,000 sets of trucks for box cars and 200 sets of trucks for platform cars. The cars and trucks to be delivered at Stratford and Montreal. Drawings and specifications can be seen at the office of the Mechanical Superintendent at Montreal. Proposals will be received up to April 26.

Chicago & Alton.

The contract for the wood work of the new bridge over the Mississippi at Louisiana, Mo., has been awarded to H. W. Armstrong & Brother, of Jacksonville, Ill.

Baltimore Union Railroad.

The stockholders of the Canton Company have authorized and instructed the directors of the company to indorse the bonds of the Union Railroad Company of Baltimore, to the amount of $600,000 in gold, on the execution by said Union Railroad Company of a mortgage to the Canton Company, and also to endorse and guarantee the payment of said bonds, with interest thereon, and also to create a sinking fund and convey the same to trustees for the liquidation of said bonds at maturity.

It was announced that the bonds had all been negotiated by Brown, Shipley & Co., of London, through Messrs. Alexander Brown & Sons, of Baltimore.

New Jersey & Delaware Central.

It is stated that this new company will, in the interest of the New Jersey Southern, build a railroad from Bombay Hook on Delaware Bay, through Clayton to Massey's, and there form a junction with the Kent County road. The latter road will be extended from its present terminus at Parson's, Md., to Deep Landing, or Rock Hall, on Chesapeake Bay, opposite Baltimore. The distance from Bombay Hook to Massey's is about 15 miles, and from Parson's to Rock Hall, six miles. The whole distance by this line from Delaware Bay at Bombay Hook to Chesapeake Bay at Rock Hall would be 47 miles, and the railroad travel on this line between New York and Baltimore would be 164 miles, with three long ferries, one from New York to Sandy Hook, about 20 miles—from Bayside, N. J., to Bombay Hook, about six miles, and from Rock Hall to Baltimore, about 22 miles, making the whole distance from New York to Baltimore about 212 miles, 23 miles longer than the present railroad route. With four changes from boat to car, or *vice versa*, it may be doubted whether this proposed line would ever prove a formidable competitor for through travel.

Wilmington, Charlotte & Rutherford.

This road was sold at auction April 10, under a decree of the Superior Court of New Hanover County, N. C. Mr. Edward Mathews, trustee for the first-mortgage bondholders, became the purchaser for $1,100,000. The road, when complete, will extend from Wilmington, N. C., to Rutherfordton, and two sections of it are now in operation, one from Wilmington northwest to Lilesville, 125 miles, and the other from Charlotte west to Cherryville, 43 miles. It has been for some time in the hands of a receiver. The bondholders have heretofore announced their intention of completing the road when it should come into their possession.

North Carolina.

The State authorities of North Carolina have obtained an injunction retraining the President and employees of the North Carolina Railroad Company from changing the gauge of that road from Greensboro to Charlotte. The gauge of the road is now 4 feet 8½ inches and the intended change was to 5 feet. The road is now leased by the Richmond & Danville Company, and the change would enable the company, whose road (from Richmond to Greensboro) is of 5-feet gauge, to run cars from Richmond to Charlotte without change.

South Branch.

The contract for the construction of this road from Green Spring Run, on the Baltimore & Ohio, 163 miles from Baltimore, southwest to Romney, W. Va., about 17 miles, has been let to Mr. Watkins, of Washington. The road is to be completed to Romney by January 1, 1874. The company intend hereafter to extend the road southwest through the counties of Hardy and Pendleton, W. Va., and Highland and Bath, Va., to the Chesapeake & Ohio road. It will pass through a section now destitute of railroad facilities.

Western Maryland.

The City Council of Baltimore has passed an ordinance authorizing the Commissioners of Finance to invest $320,000 in the purchase of $178,500 in the second-mortgage bonds of this company and $200,000 of other bonds of the company. The Council also passed a resolution that in the passage of this ordinance the Council accepts the assurances of the company that the road will be completed to the Chesapeake & Ohio Canal at Williamsport by July 1.

New York & Philadelphia.

The route surveyed for this road (formerly the National) is from a terminus at the corner of Ninth and Green streets, in Philadelphia, north alongside of the Philadelphia, Germantown & Norristown road, to the junction in the Twenty-first Ward. Thence the line turns northeast and runs through Attleboro to Yardleyville, on the Delaware, three miles above Trenton. The Delaware will be crossed on an iron bridge, 900 feet long, and the road will continue on a northeast course, nearly parallel

with the present line between Trenton and New Brunswick and five or six miles from it, to Bound Brook. Thence the line runs parallel to the New Jersey Central nearly to Scotch Plains, and thence a little north of west, passing through the southern part of Newark and across the north end of Newark Bay and striking the Newark & New York road near West Bergen, will run parallel with it to Communipaw. The length of the line from Jersey City to Philadelphia is 80 miles. The line from Philadelphia to Yardleyville, 20 miles, is being constructed under an old Pennsylvania charter.

The company announces its intention to complete and equip the road in the best possible manner and its intention to run trains through from New York to Philadelphia in not over two hours.

Pennsylvania & Delaware.

This company, which has constructed a railroad from Pomeroy, Pa. (on the Pennsylvania Railroad 42 miles west of Philadelphia), southwest to Landenburg, has been consolidated with the Delaware & Pennsylvania Company, which has nearly completed a line from Landenburg to Delaware City, Del. The consolidation has been ratified by the stockholders of both companies. The name of the new company is the Pennsylvania & Delaware Railroad Company. The line, which is 35 miles long, will be opened for business shortly. It is controlled by the Pennsylvania Railroad Company and furnishes that company with an outlet for coal and heavy freights to the Delaware at Delaware City.

West Reading.

This company has been merged in the Philadelphia & Reading. The road, which is about two miles long, has always been leased by the latter company.

Cairo & Vincennes.

A number of the officers of the Cleveland, Columbus, Cincinnati & Indianapolis Company have been inspecting this road, which has given rise to a report that that company proposed to lease the Cairo & Vincennes road. Hitherto it has been supposed to be tributary to the Pennsylvania Company, which indeed works the Indianapolis & Vincennes road.

Newburgh & Midland.

The stockholders of this company, which was organized two years ago for the purpose of building a railroad from Newburgh, N. Y., to Middletown, there to connect with the New York & Oswego Midland road, have voted to dissolve the corporation, and the necessary legal steps will be taken at once. Nothing has ever been done, except to make surveys of the line.

Panama.

There is considerable discussion over the recent election of directors of this company. It is announced that two of the new directors, Messrs. Edwards Pierrepont and G. C. Haven, have declined. It is also reported that the Howe Sewing Machine Company, of London, has been appointed the London bankers and agents of the company. The following statement of the business of the road for the first quarter of 1873 is given in the New York *Tribune*, and is said to come from one of the retiring directors:

Earnings, including estimated for March and part of February	$428 235 59
Interest, exchange, etc.	21,804 30
Total	$450,039 89
Interest on sterling bonds	$54 000 62
Working expenses	125,497 32
Claims for freight	2,024 29
Office expenses	2,210 86
Colombian drawbacks	488 05
Colombian subsidy	62,500 00
	$246,721 20
Estimated net, March 31	$203,318 69

Northern Pacific.

General Rosser with a working party left Fargo, Dakota, April 9, to open up the Dakota Division, which has not been operated during the winter.

Jacksonville, Pensacola & Mobile.

The Jacksonville (Fla.) *Union*, of April 10, says: "This railroad will be sold at Tallahassee on May 5, by United States Marshal Conant, to satisfy an execution issued out of the Fifth Judicial Circuit in favor of Daniel P. Holland."

Northern Pacific—Pacific Division.

The car shops at Kalama, W. T., are completed and will shortly commence work.

Much trouble has been experienced from heavy land slides along the line, but it was clear at latest accounts.

Railroad Legislation in Virginia.

The following acts have been passed by the Legislature of Virginia at its present session and have become laws:

Act to incorporate the New York, Norfolk & Charleston Railway Company.

Act to authorize the Fredericksburg, Orange & Charlottesville Railroad Company to create a new and first mortgage on its property and franchises.

Act to amend the act authorizing the Southwestern Virginia Mining, Smelting & Transportation Company to construct a railroad from King's Salt Works to a point on the Virginia & Tennessee Railroad at or near Dublin.

Act to authorize revocation of subscriptions to the Valley Railroad Company, and the transfer of the same on certain conditions.

Act to amend charter of Richmond & Lynchburg Railroad Company, so as to change the name and extend the time within which it may commence and complete said railroad.

Act to amend charter of Burkeville, Lunenburg & Mecklenburg Railroad Company.

Act to amend act to authorize the Washington City, Virginia Midland & Great Southern Railroad Company to acquire and sell lands.

Act to incorporate the Rappahannock & Hanover Junction Railroad Company.

Act to amend charter of Shawsville, Jacksonville, Taylorsville & North Carolina Railroad Company.

Act to incorporate the Brock's Gap, Hardy & Hampshire Railroad Company.

Act to incorporate the Danville & New River Narrow-Gauge Railroad Company.

Act to authorize City of Richmond to contribute to the building of a railroad from Keysville to Clarksville.

Act to incorporate the Danville & Franklin Railroad Company.

Act in relation to the Norfolk & Southern Railroad Company.

Joint resolution in relation to the sale of the State's interest in the Richmond & Danville Railroad Company, or other internal improvement companies of the State.

Broad Ford & Mount Pleasant.

The *United States Railroad and Mining Register* says of this road: "This road was leased to the Pittsburgh & Connellsville Company, the agreement being that the latter was to pay 6 per cent. per annum on the capital stock invested in the road. The road was a most important feeder for the Connellsville line, because of the immense quantities of coal and coke manufactured and shipped from that region. Indeed the traffic increased so rapidly that the Pennsylvania Railroad Company determined to make an effort to secure a share of the carrying business, and with that object in view projected the Southwestern Pennsylvania Railroad, from Greensburg to Connellsville, and thence through the coal and coke regions of Fayette County. While the Connellsville road remained under the control of Pittsburghers, the coal and coke dealers gave but little encouragement to the new enterprise of the Southwestern Pennsylvania road. But when an entire change in the policy of the Pittsburgh, Washington & Baltimore line took place, and the freight tariff on coal and coke was materially advanced despite the protest of the manufacturers and operators, a strong feeling was developed in favor of the new road, and that feeling prompted assistance which has carried the road forward to completion.

* * * * * * * *

"The reason assigned for the summary proceedings by which the connection between the Southwestern and Mount Pleasant roads was completed was that the Pittsburgh, Washington & Baltimore Company had violated the provisions of the lease under which they held control, the money to be paid having thus far been withheld. The officers of the Pittsburgh, Washington & Baltimore Company deny that they have violated the terms of the lease, and while admitting they have not paid over the amount of money stipulated in the agreement, they claim the fault is with the officers of the branch road. They have neglected and refused to give an official statement of the amount of their capital stock, and as the sum to be paid is based on the amount of stock invested, the Pittsburgh, Washington & Baltimore authorities claim that it is necessary for them to have some official information on that point."

Lehigh Valley.

The holders of bonds and coupons maturing May 1 next are notified that the company is now prepared to pay, upon presentation at their office, $200,000 of the bonds and coupons at par, with a rebate at the rate of 8 per cent. per annum until date of maturity. When this issue of bonds is paid, the new 6s will be the company's first mortgage bonds. The object of anticipating payment of the old bonds is said to be mainly to lighten the labor and lessen the crowd that might otherwise accumulate on the 1st of May.

Engineers are now making surveys for a relocation of the road between Centralia, in Columbia County, and Shenandoah City, in Schuylkill County, a distance of nine miles.

New Jersey Railway.

A company by this name has recently been organized under the new general law of New Jersey and filed its certificate with the Secretary of State, April 8. The necessary amount of stock has been subscribed and ten per cent. paid in, and the company intends to begin operations at once. The route of the road proposed begins at the Delaware River in the town of Ewing, about three miles north of Trenton, and thence follows the line of the Mercer & Somerset road (which road it is proposed to make part of the line) to Millstone and thence through Bound Brook to the New York Division of the Pennsylvania road, near Waverly, a short distance south of Newark. This line is about parallel and in many cases close to that of the New York & Philadelphia (National) road. The company is said to be organized in the interest of the Pennsylvania Railroad Company, and declares its intention to construct the road at once.

Central of New Jersey.

The board of directors of this company has issued a statement to stockholders, showing the operations for the three months ending March 31. The net earnings for the three months were $502,188.22, an increase of 45¾ per cent. over the corresponding period last year. Notwithstanding this, as the state of the money market has prevented the sale of bonds as rapidly as required, and the net earnings have been necessarily used for other purposes, the board has deemed it judicious to defer the question of dividends till July.

The company is expending a large amount in new construction, laying two additional tracks on their New Jersey line and a second track on the Lehigh & Susquehanna Division.

Cuyahoga Valley.

A large force of men is at work near Akron, O. Mr. T. P. Cordray is contractor for the whole line from Akron to Cleveland, 35 miles.

Walla Walla & Columbia River.

Work on this road, from Walla Walla, Oregon, to the Columbia River at Wallula, will soon be resumed. The iron for the road is now at Wallula, with two locomotives and a number of cars. The company hopes to have the road completed and open by September 1.

International & Great Northern.

Regular trains are now running to Tyler, Texas, and the track is laid for several miles beyond that point.

Southern Pacific, of California.

Track on the Salinas Branch is laid to near Soledad Crossing, 17 miles beyond the late terminus.

The engineering parties have all been transferred to the main line at Tipton, in Tulare County, south of Visalia.

Indianapolis, La Salle & Clinton.

A dispatch from Clinton, Iowa, says that reliable information has been received by the Citizens' Association of that place to the effect that responsible parties have agreed to iron and stock this road as soon as the grading is done.

LOCOMOTIVE RETURNS, DECEMBER, 1872.

Master Mechanics of all American railroads are invited to send us their monthly reports for this table.

Name of Road.	Number of miles operated	Number of Locomotives in service	Mileage. Passenger	Freight	Miscellaneous	Total	No. of Miles run to Ton of Coal	Cord of Wood	Pint of Oil	Cost per Mile, in Cents. Repairs	Fuel	Stores	Miscellaneous	Engineers, firemen and wipers	Total	Average Cost of Coal, per ton	Wood, per cord.	Oil, per gallon
Burlington & Missouri River	.....	64	53,104	68,864	38,470	160,238	35.96	36.36	13.82	7.40	7.18	0.69	....	7.91	23.18	$ 2.50	$ 4.00	....
California Pacific	148	11	14,145	6,855	5,675	26,675	.....	48.39	19.07	4.38	10.33	0.79	....	6.11	21.61	.....	5.00	....
Central Pacific (Western Division)	773.4	45	39,540	41,046	31,760	112,346	50.84	.....	13.26	12.29	22.92	0.98	....	6.82	43.01	11.78	5.00	....
" " (Sacramento Div.)	119.5	38	14,092	34,877	26,897	77,866	.....	34.56	14.33	12.58	11.57	0.92	....	7.26	32.33	.....	4.00	....
" " (Truckee Div.)	234.5	27	12,460	43,015	9,085	64,560	33.20	40.17	12.56	9.21	23.15	1.08	....	8.40	41.54	9.25	4.00	....
" " (Humboldt Div.)	236.6	23	15,159	32,908	6,100	54,167	39.31	.....	13.52	7.50	18.29	0.93	....	6.95	33.67	7.00	9.00	....
" " (Salt Lake Div.)	182.8	20	10,986	45,591	6,200	62,777	38.32	.....	11.53	8.82	13.51	1.09	....	7.39	30.81	5.00	9.00	....
" " (Oregon Div.)	151.5	8	11,222	7,540	5,240	24,002	.....	42.78	25.26	3.80	11.69	0.53	....	6.58	22.60	.....	5.00	....
" " (Visalia Div.)	146.3	9	9,010	9,555	5,600	24,165	71.43	48.70	16.36	5.47	16.51	0.80	....	6.77	29.55	12.25	5.00	....
Chicago & N. W. (Wis. & Mil. Div.)	.....	89	58,072	76,400	49,005	183,478	26.37	.....	.....	10.84	15.60	1.03	....	9.22	36.65	3.50	4.75	....
" " (Madison Div.)	.....	17	12,723	23,611	12,821	49,155	28.87	.....	.....	10.12	15.29	0.97	....	7.90	34.18	3.50	4.75	....
" " (Galena Div.)	.....	71	49,847	71,366	45,510	166,723	29.78	.....	.....	11.44	12.19	1.12	....	9.24	33.99	3.50	4.75	....
" " (Iowa Div.)	.....	76	41,033	69,516	32,191	142,740	26.29	.....	.....	7.26	13.68	1.01	....	9.46	31.41	3.50	4.75	....
" " (Peninsula Div.)	.....	20	3,480	7,962	32,398	44,340	49.03	.....	.....	2.40	9.67	0.72	....	9.78	22.57	3.50	4.75	....
Chicago, Rk. Isl. & Pacific (Ill. Div.)	.....	80	37,183	144,371	3,530	185,084	36.58	.....	17.60	5.23	7.74	0.51	....	6.91	20.39	2.75	4.00	....
" " " (Iowa Div.)	.....	105	67,231	153,209	30,781	251,221	34.68	.....	12.66	4.54	8.13	0.66	....	7.19	20.52	2.75	4.00	....
Cleve., Col., Cin. & Ind. (Ind. Div.)	207	58	25,650	120,125	29,700	175,505	38.49	.....	20.87	5.16	7.79	0.62	....	8.26	21.83	3.00	....	....
" " " (Col. Div.)	138	49	24,830	72,908	40,220	137,958	42.27	.....	20.83	4.54	7.10	0.71	....	7.19	19.54	3.00	....	....
" " " (Cin. Div.)	130	27	20,295	28,744	21,192	70,231	45.25	.....	16.87	1.69	7.10	0.67	....	7.98	17.34	3.00	....	....
Cleveland & Pittsburgh	.....	81	.....	.....	.....	204,500	53.71	.....	19.77	3.78	6.19	0.69	....	7.22	17.88	2.80	1.95	....
Denver Pacific	.....	.....	8,592	4,634	3,356	16,576	47.41	.....	33.75	2.12	6.89	0.49	....	6.65	16.17	3.50	4.58	....
Flint & Pere Marquette	.....	29	23,642	25,394	21,729	70,765	.....	50.05	23.58	3.75	8.99	0.91	....	7.12	20.77	.....	4.50	....
Hannibal & St. Joseph	.....	65	35,418	76,396	27,435	139,249	45.60	.....	20.20	3.70	6.10	0.90	....	7.50	23.20	2.53	5.00	....
Illinois Central (Chicago Division)	252.50	68	47,464	108,690	42,444	198,593	32.93	.....	12.2	9.03	6.14	0.68	....	6.60	22.45	1.90	4.30	0.50
" " (South Division)	230.75	34	25 375	60,031	13,196	99,602	33.27	.....	11.0	6.60	6.09	0.75	....	6.47	19.90	1.90	4.30	0.50
" " (North Division)	225	45	29,657	84,858	16,304	130,219	26.37	.....	10.80	7.69	7.42	0.77	....	6.60	22.48	1.90	4.30	0.50
" " (Iowa Division)	401	35	29,644	64,112	12,146	105,902	32.96	.....	18.6	3.76	7.89	0.50	....	5.89	23.04	2.50	5.50	0.50
Kansas Pacific	.....	.....	58,776	74,403	44,563	177,824	36.46	.....	12.82	7.16	10.51	0.61	....	7.42	25.70	3.75	3.93	....
Leavenworth, Lawrence & Galveston	.....	16	17,256	17,448	3,273	37,977	59.71	.....	30.9	3.16	6.79	0.48	....	7.18	17.61	3.85	2.25	....
Marquette, Houghton & Ontonagon	.....	15	.....	.....	.....	31,884	54.31	.....	17.46	13.33	11.35	1.03	....	10.61	36.37	.....	.....	....
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Pennsylvania (New York Division)	.....	110	154,250	115,246	6,696	276,192	38.30	45.25	8.84	7.70	12.70	1.30	....	.....	21.70	0.16	6.40	....
" (Amboy Division)	.....	58	50,680	43,832	5,510	105,022	46.95	49.50	11.24	4.10	11.10	1.10	....	.....	16.30	0.16	6.40	....
" (Belvidere Division)	.....	33	20,575	29,810	4,303	54,389	37.67	40.00	12.38	6.60	14.10	1.30	....	.....	22.00	0 16	6.40	....
" (Philadelphia Div.)	.....	133	76,666	237,225	9,425	323,316	35.80	.....	17.29	4.60	7.00	0.90	....	.....	12.50	0.07	3.84	....
" (Middle Division)	.....	117	68,932	249,882	11,337	330,151	27.48	.....	18.52	5.60	7.70	0.70	....	.....	14.00	0.07	3.84	....
" (Pittsb'g Div., E. End.)	.....	76	12 305	151,498	3,562	167,365	22.90	.....	10.96	6.20	9.00	1.10	....	.....	16.30	0.07	3.84	....
" (Pittsb'g Div., W. End.)	.....	115	77,381	184,805	7,126	269,312	32.72	.....	13.74	5.90	6.60	0.90	....	.....	13.40	0.07	3.84	....
" (Tyrone Division)	.....	26	11,089	23 050	2,253	36,392	29.83	.....	22.32	10.60	7.00	0.70	....	.....	18.30	0.07	3.84	....
" (West Penn'a Div.)	.....	28	16,260	41,982	2,705	60,953	31.81	.....	24.63	7.60	6.60	0.50	....	.....	10.00	0.07	3.84	....
" (Lewistown Division)	.....	9	7,371	9,530	745	17,646	37.59	.....	12.56	16.00	5.70	1.10	....	.....	22.80	0.07	3.84	....
" (Bedford Division)	.....	8	3,440	7,260	870	11,570	52.02	.....	12.50	11.30	4.30	1.00	....	.....	16.60	0.07	3.84	....
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P.ttsb., Cin. & St. Lo. (L. Miami Div.)	.....	39	50,922	45,847	2,130	98,899	40.20	.....	11.50	4.50	7.10	0.90	2.50	7.90	22.90	2.12	3.30	....
Pittsb'g, Ft. Wayne & Chic. (E. Div.)	319.2	152	81,318	302,163	14,191	397,672	34.94	.....	13.19	3.64	7.94	0.94	2.23	7.25	22.60	.....	.....	....
" " " (W. Div.)	280	101	79,888	205,735	20,811	306,234	49.00	24.00	17.90	3.00	11.40	0.50	....	6.90	21.80	3.00	3.25	....
San Francisco & North Pacific	36	3	3,450	3,320	750	7,520	.....	40.21	16.14	5.61	12.43	0.32	....	3.56	24.42	.....	5.00	....
South Carolina	.....	38	12,957	57,161	13,400	33,518	.....	88.15	31.25	5.18	6.45	0.64	....	.....	12.77	.....	2.46	0.60
Selma, Rome & Dalton	.....	.....	.....	.....	.....	42,918	.....	49.60	.....	6.70	4.60	0.86	....	0.40	22.50	.....	2.14	....

YEAR ENDING DECEMBER 31, 1872.

Cleve., Col., Cin. & Ind. (Ind. Div.)	207	69	314,911	1,500,947	363,211	2,134,069	41.67	.....	19.38	4.24	7.04	0.59	....	7.69	19.56	2.93	....	....
" " " (Col. Div.)	138	53	329,396	894,045	559,647	1,693,088	48.38	.....	22.75	4.23	6.12	0.65	....	6.78	17.78	2.93	....	....
Kansas Pacific	673	....	758,939	1,086,147	630,184	2,475,270	42.17	.....	14.15	6.44	9.57	0.61	....	6.72	23.34	3.98	3.91	....
Lackawanna & Bloomsburg	80	26	154,656	311,550	225,070	691,276	.....	.....	39.76	5.82	.....	0.67	....	6.63	13.13	.....	.....	....
Pittsb., Ft. Wayne & Chic. (E. Div.)	319.2	159	971,875	3,690,075	126,167	4,788,117	41.14	.....	14.39	3.74	6.25	0.89	1.41	7.20	19.49	.....	.....	....
" " " (W. Div.)	280	110	999,757	2,343,147	248,018	3,590,922	71.50	26.70	17.85	3.30	10.80	0.60	....	7.00	21.70	2.65	3.25	....
St. Paul & Pacific	315	....	265,605	284,458	90,724	640,787	.....	45.04	17.87	7.77	7.85	0.71	....	6.78	23.11	.....	3.53	....
Lake Sh. & Mich. Sou. (Buffalo Div.)*	.....	82	330,250	1,461,670	748,750	2,540,670	50.15	.....	15.51	4.55	6.97	....	....	6.36	17.88	3.50	3.50	....
" " " " (Erie Div.)*	.....	93	428,411	1,650,283	629,581	2,708,255	42.44	32.16	15.65	5.62	8.61	....	....	7.25	21.48	3.50	4.00	....
" " " " (Toledo Div.)*	.....	74	446,315	1,530,623	403,565	2,380,503	46.40	51.00	14.28	4.42	8.36	....	....	6.98	19.76	4.00	4.00	....
" " " " (Mi.So. Div.)*	.....	163	1,433,363	2,479,239	1,993,499	5,849,106	41.43	42.67	18.93	5.52	8.52	....	....	5.78	19.53	4.50	3.50	....
Toledo, Peoria & Warsaw	243	41	.....	.....	.....	1,274,379	.....	.....	.....	6.40	6.30	1.10	....	7.10	20.90	.....	.....	....
Atlantic & Gulf	346	27	.....	.....	.....	635,350	.....	52.56	17.85	8.00	4.70	0.90	....	.....	13.60	.....	2.45	0.46
Illinois Central	1,109	197	1,470,195	3,512,102	905,929	5,899,226	33.95	.....	12.80	8.50	6.05	0.63	....	6.33	21.76	.....	....	....

EIGHT MONTHS ENDING DECEMBER 31, 1872.

Burlington & Missouri River	.....	69	426,462	729,119	403,361	1,558,942	38.83	62.22	14.60	4.95	7.44	0.67	....	7.70	20.76	2.83	3.79	....
Chicago, Burlington & Quincy	787	209	1,027,620	1,517,271	959,074	3,503,965	40.83	.....	14.01	8.42	10.80	0.74	....	7.37	27.33	4.00	6.00	....

SIX MONTHS ENDING DECEMBER 31, 1872.

Cleve., Col., Cin. & Ind. (Cin. Div.)	130	33	112,679	131,033	172,447	416,159	48.86	.....	18.64	3.16	5.74	0.65	....	6.61	18.16	3.09	....	....
Northern Pacific	634	....	187,211	436,086	528,459	1,131,756	.....	45.03	15.22	3.59	7.48	0.74	....	6.82	19.02	.....	3.43	....

* Switching Engines allowed six miles per hour. † 1.04 lbs. sand used per mile run.